THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXXII. No. 797.] LONDON, AUGUST 20, 1878. [30th Year.] Price 6d.

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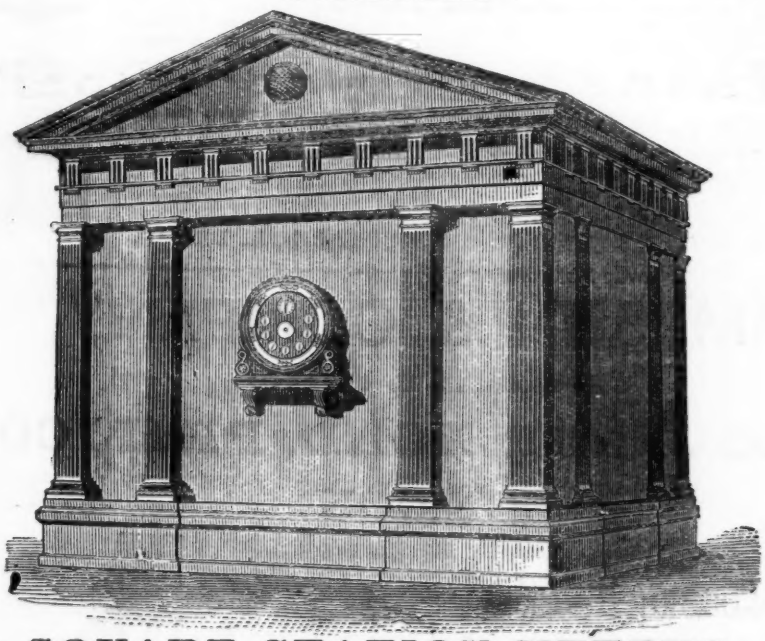

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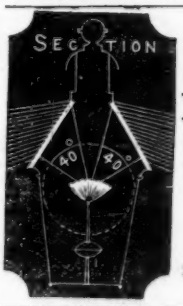

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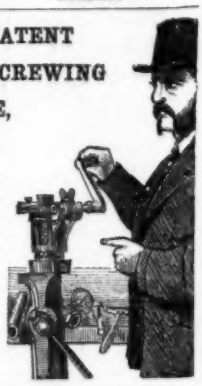

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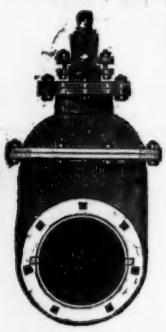

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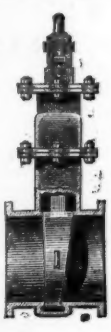

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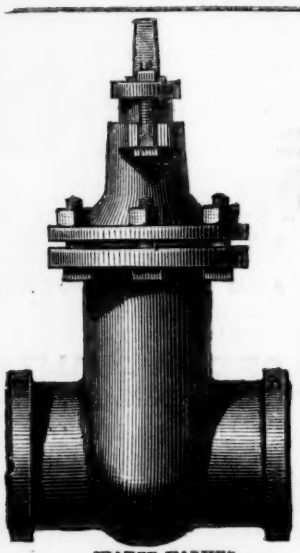

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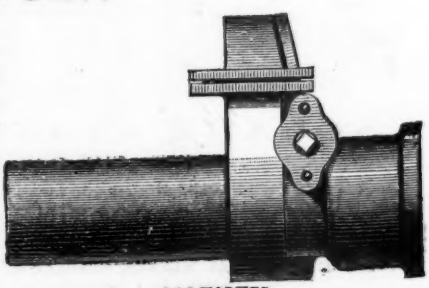

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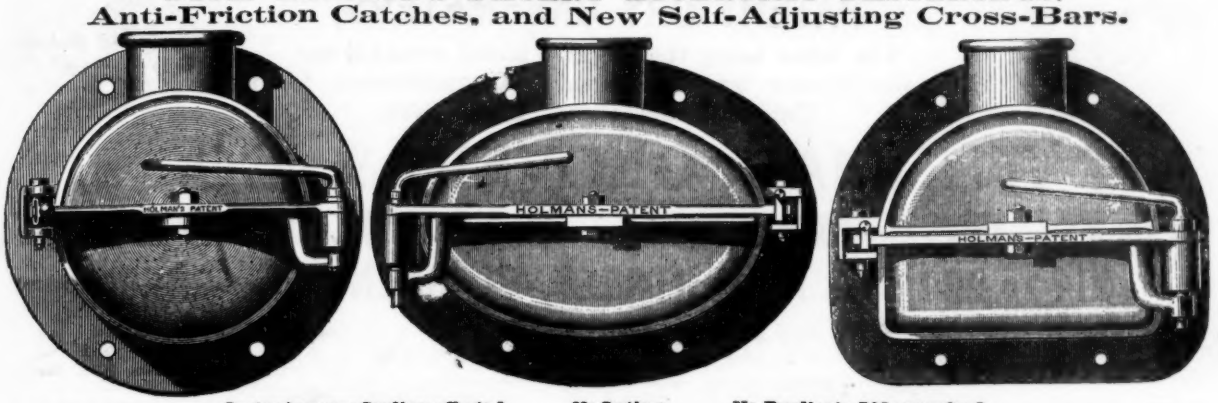

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And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

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The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

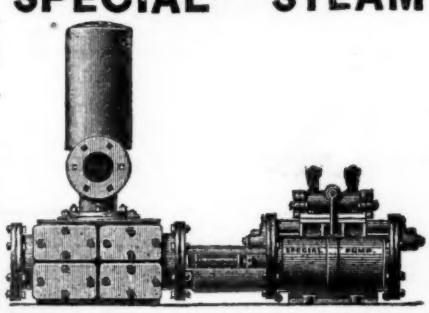
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851 New York. 1853. Paris, 1855. London. 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.

(ESTABLISHED 1816)

ARE THE ONLY MAKERS

OF THE

LOW-PRESSURE WATER-METER.

These Meters will register with perfect accuracy, either at full speed, or with a few drops only passing through them.

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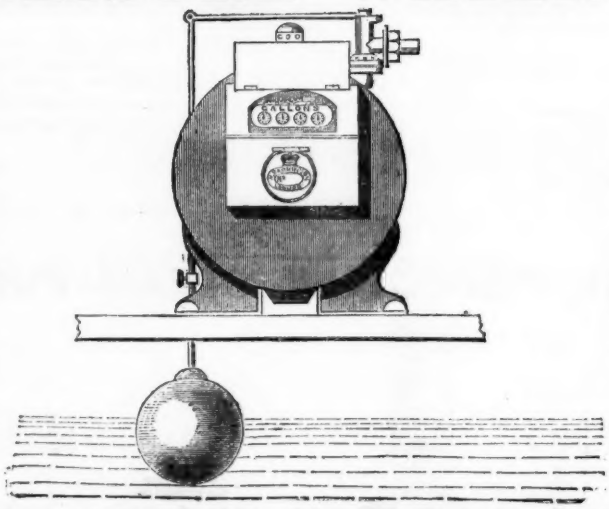
The 100-gallon Meter is fitted with a cistern holding about three or four gallons, and may be fixed inside a house, free from the effects of frost, and requires no attention after once being fixed.



From "The Engineer," April 6, 1877.

"Low-pressure Meters have been found to register with almost perfect accuracy, or, at all events, within 5 per cent. either for or against the consumer, and from the nature of their construction are by no means easily deranged. Still, even the low-pressure meters have their disadvantages, but these are chiefly as respects the question of first cost, seeing that they must have a cistern fixed at a higher level than that at which the supply is needed. All things considered, however, the balance of opinion rules at present in favour of the low-pressure Meter, and they are consequently increasing in favour as time goes on."

These Meters have been manufactured by W. P. & Co for more than 25 years and are largely used by the following and other Water Companies:—

NOTTINGHAM, DERBY, LEICESTER, SUNDERLAND, GREAT YARMOUTH, SHEFFIELD, NORWICH, LOWESTOFT, COVENTRY, SOUTHEND.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

W. YOUNG, Clippens.—*Your letter is in type, but is unavoidably held over.*

T. E. M.—*See "Correspondence" in our present issue.*

X. Y. Z.—*Galvanised wrought iron is not a good material for service-pipes.*

J. R. C.—*For sulphate of ammonia, consult "Muspratt's Dictionary of Chemistry;" and for tar distilling, "Gesner's Practical Treatise on Coal, Petroleum, and other Distilled Oils;" or "Mills's Manualette of the Paraffin, Coal Tar, Rosin Oil, Petroleum, and other Kindred Industries."*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 20, 1878.

Circular to Gas Companies.

IT is natural, of course, that amalgamation should form one of the principal topics of the Governor's speech at the meeting of the Chartered Company last Friday. All the advantages which the Governor claimed for it have been fully realized, and there can be no doubt that much additional benefit will accrue to both Shareholders and Consumers by a wider extension of the process. From every point of view, as we said last week, amalgamation is desirable; and we may express a fervent hope, that when the Directors of the several Companies who are negotiating meet at Horseferry Road to-day, no difficulty will be raised which will stand in the way of the union now contemplated. There is, however, a point which must come up for consideration, but respecting which much thought has, no doubt, been bestowed, and a clear path marked out. This is, the position which the South Metropolitan Company will assume if their amalgamation be effected. In the cases of the Phœnix and the Surrey Consumers Companies, no difficulty can possibly arise. They are still under the Act of 1860, and will simply slide, as we may say, into the constitution of the Chartered, joining in all their rights, privileges, and responsibilities. But, as our readers know, the South Metropolitan Company are under modern legislation, and were forced, when their Act was passed, to accept, with the sliding scale, a lower standard or initial price than was imposed on the Chartered. The starting price of the Chartered is 3s. 9d. per thousand feet, and that of the South Metropolitan 3s. 6d.; hence arises a difficulty, which an Order in Council may possibly surmount, but we do not exactly see how. The point, however, must have been well considered before amalgamation with this Company was proposed by such experienced minds as have promoted it; and we may take it as certain that it is clearly seen that this difference of standard price is actually no real obstacle to the combination.

How important the union will be is clearly shown by the capitals which the Companies concerned have raised, and are entitled to raise. At the present time the Chartered Company, as now constituted, have raised £8,400,354, and are entitled to make additions to the amount of £2,426,146. The Phœnix Company have raised £1,121,000, and have power to increase their capital by a further sum of £123,000, making a total of £1,244,000. The Surrey Consumers Company have raised £290,000, and have power to add to it a further sum of £20,000, making a total of £310,000. *En passant*, we may remark that these two latter would, in the course of a year or two, be compelled to apply to Parliament for further powers, when they would be placed under the same obligations as the Chartered, without enjoying their special opportunities. As regards the South Metropolitan, the amount of capital they have raised is £480,000, and they have power to raise a further sum of £520,000. Thus, if the several amalgamations take place, the Chartered Company will have a grand total of £10,291,354 capital raised, with power to increase it to £13,380,500. We say nothing about the increased area of supply, which will then embrace, at least, six-sevenths of the Metropolis.

It may be here observed that a large field still exists for future operations on the part of the Company. The western district is far from being filled up, and the southern, which will be acquired, affords wide opportunities for extension of consumption. Thus the Chartered Company of the future will be a body much surpassing in importance that of to-day.

In starting a new industry, it is well to begin cautiously, and the Governor's statement that they were going to feel their way in the utilization of residuals will reassure some timid Shareholders who are doubtful about the profits of that part of the business. It is well, as we said, to begin cautiously, but the larger the scale upon which operations of this kind are carried on, the more profitable they become. We hope the day will arrive when the Company will work up all the residuals produced at their several stations.

A further reassurance was given by the Governor in his account of the electric light. Mr. Sugg, who has been specially engaged by the Company, reports that, in his opinion, the electric light is even not well adapted for the illumination of large spaces. We quite agree with what he says as to the want of volume of light, which is a matter of great importance. An intense focus of light is of very little value in lighting up a large area; moreover, the effect is extremely disagreeable, as Mr. Sugg found. As to cost, very little is as yet known, and that little is not alarming to Shareholders. The experiments now being made by the Chartered Company will determine this point with accuracy. The Directors deserve thanks for entering upon this investigation, the results of which will be of much interest.

Mr. G. H. Stayton, C.E., Surveyor to the Chelsea Vestry, has been to Paris to look at the light, and has brought back some fuller particulars. In a report to his Vestry, he states that one Gramme machine, actuated by a sixteen-horse power engine, is required for every sixteen lamps, and that the cost of the light far exceeds that of gas. The fact appears to a certain extent forgotten, that the electric light is used for but a short time. At midnight it is turned off, and gas is substituted, so that gas is made the companion rather than the competitor of the light. It must be so in London, if ever any attempt be made to introduce the light to any of our public spaces. Mr. Stayton sums up his observations with the remark that, in its present state of development, electricity cannot be adapted for street illumination. Taking Sloane Street as an illustration, Mr. Stayton finds that, for thirty-two lamps, two electric stations would be required. The cost of these, and the alteration of the lamp-columns and conducting apparatus, would amount to £3200. The cost of maintenance he calculates at 16s. per hour, and 3250 hours consumption per annum would be required, unless the lights were extinguished and gas substituted at midnight, as in Paris. Thus the annual cost of lighting this street by electricity would amount to £2600. The present cost of lighting the same street by gas per year is, according to Mr. Stayton's report, for forty lamps, £133 3s. 4d., or 8¼d. per hour. No economy can, therefore, be expected by the substitution of electricity for gas in Sloane Street. (We take the figures as we find them in the report.) We fear that Mr. Stayton's employers will not rejoice over this statement. They are extremely anxious to get rid of gas and gas-works, and everything connected with gas, except the rates the Gas Company pay.

With all that is said about the hygienic qualities of the light, we, of course, perfectly agree. It does not vitiate the air, it

gives off no noxious vapours, it produces but little heat, and involves no risks of explosions. All this is very true; but the light is not yet a domestic institution. If it should ever become so, various discomforts may be found to result from its employment. Among the first, we may calculate on frequent attacks of inflammation of the eyes.

The Corporation of Nottingham are highly successful in the management of their gas undertaking. The accounts for the past year, laid before the Council on the 12th inst., show that a profit of £12,524 has been made during the year, notwithstanding the fact that considerable expense has been incurred in making extensions, &c. The favourable circumstances of the undertaking justified the Committee in once more reducing the price of gas. They have taken off twopence per thousand feet, which brings the price to the lowest ever charged by the old Gas Company. We may say that this reduction was due to the consumers, who, it seems, entertained the Prince of Wales, on his recent visit to that city, at a cost of £5000—that is to say, the expenses of the Royal visit have been paid out of the gas profits. Under the circumstances, we shall not quarrel with the appropriation of the profits, for it seems that the reduction of twopence per thousand feet will give back the £5000 within the next year. The balance of profit is placed to the credit of the reserve and sinking fund. We agree with the Chairman of the Committee in thinking that it is advisable to add regularly as much as possible to this fund. The Corporation must be congratulated upon the condition of the works, and the great prosperity of the undertaking. They very properly are preparing for the extensions which will soon be required, in consequence of the regular increase in the consumption of gas. At present they simply propose to add to existing works, but before many years are over they will find it necessary, we should think, to construct entirely new establishments.

The Industrial Exhibition at Wolverhampton, to which we alluded last week, appears to have been a private speculation. None the worse for that, if matters are properly conducted; but the exhibitors—at all events those of gas apparatus—appear to be very dissatisfied with the awards, and some of those who were on the prize list declined to accept their medals. The business of judging was conducted in a very different manner to what it was at the Exhibition at Birmingham. There a complete and exhaustive examination was made, by able judges, of every exhibit, and therefore the prizes awarded had a substantial value. At Wolverhampton the work appears to have been done in a very perfunctory manner; not a stove, we understand, was lighted, and, practically, no examination at all was made. We are very sorry for this, and we are glad that the exhibtors resent the almost insult offered to them.

The recent Meeting of the North British Association of Gas Managers seems to have been very instructive and enjoyable. The papers read possess much interest and value, and the members must have left St. Andrew's with a good deal of information added to their stock of knowledge. The additional day allowed of a very pleasant trip to the Dundee Gas-Works and the Tay Bridge, the former exciting a good deal of attention, and the latter some wonder at its enormous proportions.

The Corporation of Ayr and the Gas Company are not just now on very good terms. Since the existing Company took over the works of the British Gaslight Company, several agreements have been entered into with the Corporation, in one of which it seems that the Company bound themselves not to pay a larger dividend than six per cent. To this arrangement they have adhered; but, having more profit than was required to pay the dividend, they very properly applied the surplus in extending the works and setting aside a large cash balance. The Corporation hold that these latter proceedings constitute a violation of the agreement, which was intended to compel the Company to apply all surplus profit to a reduction of price. Having obtained legal opinion that the Company are perfectly justified in what they have done, the Corporation are now considering how to have their revenge. The Ayr Company is a non-statutory one, so a rival undertaking is spoken of. There is also a question of effecting a purchase, under the Burghs (Scotland) Gas Act; but the Company will in all probability refuse to sell, and an arbitration may prove costly to the Corporation if they acquire the undertaking. The error lay in compelling the Company to accept the small dividend of six per cent., which justifies the appropriation of surplus profits to the advantage of the Shareholders in other ways.

Are three public lights, each burning three and a half feet per hour, covering one hundred and twenty yards of a street, equal to two burning five feet per hour, placed within the same space? This is a question which the Ipswich Town Council have to discuss. There is great dissatisfaction with the public lighting of their borough, which will, no doubt, increase as the dark evenings come on. For economy's sake the Council substituted three-and-a-half-feet burners for five, and without at the same time increasing the number of lamps. The result, except in a financial sense, and this only in a small degree, has not given satisfaction. Complaints are made that when the shops are shut up there is no light in the streets. Parsimony never succeeds in the matter of gas lighting. The Town Council had better revert to the five-feet burners, and retain the number of lamps they have at present. The ratepayers will not object to pay if the streets be efficiently lighted.

A Company has been formed under the name of the Albo-Carbon Light Company, Limited, to work two patents taken out by Messrs. Kidd. Only the first of these, No. 2860, July 26, 1877, is before us; the other, No. 244, Jan. 18, 1878, is, we understand, not yet published. The invention described in the first of these patents, entitled, "Improvements in Means and "Apparatus for applying Heavy Oils to Illuminating Pur-"poses," bears a wonderful resemblance to that brought out by the Rev. W. R. Bowditch fifteen or sixteen years ago. There are, of course, differences in the apparatus, as any one may see who will compare the drawings in this specification and those given in Mr. Bowditch's book, but the principle is exactly the same. Heavy oils in a reservoir are vaporized by the heat of a gas-flame underneath, and the vapour being mixed with the gas necessarily gives it a high illuminating power when consumed. There is nothing new in this, and we fail to see that the present patentees have much improved upon Mr. Bowditch's invention. The new Company comes out under very good auspices. The Memorandum of Association is signed by Mr. Harry Chubb and Mr. F. J. Evans, who each take one share. The capital of the Company, we may say, is £24,000, in 480 shares of the nominal value of £50 each. Why Mr. Bowditch did not succeed with his invention we never learned. His apparatus certainly produced a most brilliant effect, and was credited with producing a great saving in the consumption of gas. The invention we notice may be expected to achieve the same object, and it may be argued that its adoption will promote the utilization of residuals. Heavy oils are, at present, rather a drug in the market, and we have a fear that these inventions will not much add to their value. Mr. Bowditch will probably look with some astonishment at this reproduction of his old idea, and the least selfish of men may regret that he did not get up a Company, with gentlemen experienced in gas matters at its head.

Water and Sanitary Notes.

THE Metropolitan Water Companies must prepare themselves for an active campaign in the ensuing session of Parliament—that is, unless some personal changes take place in representations between now and next February. Colonel North, whose seat is probably safe, has given notice that he will, early next year, call the attention of the House to the whole question of the Metropolitan Water Supply, and move that an address be presented to Her Majesty, praying her to appoint a Royal Commission of Inquiry on the present system of supplying the Metropolis with water. The Royal Commission may or may not be appointed; but, whether it be or not, we unhesitatingly assert that no change can possibly be made, with our present instruments and knowledge, in the mode of charging for a domestic water supply. One thing may be done, whereby the cost of management of the Water Companies may be so lessened that a reduction in the rates may be possible, and that is a general amalgamation of the Metropolitan Water Companies. We know the difficulties of effecting such an union, especially with regard to the New River Company; but these are not insuperable, and there are, in the City and outside, financiers who would, without much labour settle the terms upon which all the Companies might unite, and supply water to the Metropolis at one uniform rate. We throw out once more this hint about amalgamation. Our readers will have seen how much has already been effected by the union of the Gas Companies, and we hope that they will, in the course of a year or two, learn how much consumers have benefited by a still further amalgamation. The economy which might result from the combined management would be very large, and we are quite certain that every one who desires continued life for the Companies, who have conferred such infinite benefits upon this Metropolis, will join with us in advocating immediate attempts to effect their union. Mr. Fawcett, whose seat is as safe as, or safer than that of Colonel North, has intimated his intention of attacking the Companies on the system of rating for supply. He believes that the Companies have enormously increased their rates, which, we are given to understand, is not a

fact. Changes of rates have been made since the last valuations; but no great advance has been made in the charges for water. We wish our readers to understand clearly that they must prepare themselves, not exactly for a struggle next year, but they must, when the matter is brought forward next session, as it is certain to be, provide themselves with defensive statements to show how false are the charges now popularly brought against them. The Companies are perfectly safe; but it would be well that they should set themselves right with the public, whose minds are poisoned by the assertions of ignorant agitators.

By a majority of forty-two to two, the City Council of Manchester have decided to re-introduce next session a Bill to carry out the Thirlmere scheme. The majority is significant; for Alderman King, by speeches and letters to the Press, is doing his utmost to persuade the people of Manchester that they will have no occasion for any additional water supply, beyond the present, for the next eighteen years. Taking his own, or, rather, as he calls them, Mr. Bateman's figures, as showing the annual increase of consumption, we are contented with the fact that his statements failed to convince more than two members of the Council, one of the credulous being himself. What chance the Thirlmere scheme will have in Parliament next year we shall not undertake to predict. This year, after a triumphant passage through the Commons, it failed in the Lords on a purely technical point. The advisers of the Corporation are now perfectly alive to the necessity of following closely the regulations of parliamentary practice, and, after the experience of last session, will no doubt give all proper notices.

Recurring, for a moment, to Alderman King, we may here just mention that the wants of Manchester in the matter of a water supply are continually increasing. Whatever works may be designed to supply the ever-growing necessities, they will take many years to complete and to be brought into operation. The execution of the Thirlmere scheme will occupy, it is calculated, ten years; and whatever other works may be designed will probably take as long to complete. Thus but a small margin is left; and, whatever may be said to the contrary, it is quite time that Manchester looked out for a new source of water supply.

Subsequently to the publication of Alderman King's letters, the Mayor, at a City Council meeting, successfully refuted the Alderman's figures, and inferentially showed the necessity for taking immediate steps to provide an additional supply of water. A town's meeting, under the Borough Funds Act, has since been held, at which a resolution to support the Council in the promotion of their Bill was carried by a large majority. We regret, however, to say that an obstructive demanded a poll, which will cost the ratepayers about £1400. Our readers will remember the part we took in advocating the principles of the Borough Funds Act; but, when we did so, we never contemplated that a resolution carried by a large majority at a *bonâ fide* town's meeting would be disputed by a few obstructives. There are over 68,000 burgesses in Manchester, and only a small number of these attended the meeting; but the feeling of the ratepayers is very well known, and it is simple wantonness to incur the expense mentioned above.

The Liverpool Town Council are evidently dissatisfied with a well supply for a portion of their district, and they now propose to mix Rivington water with that obtained from Bootle wells, so that the hardness shall not exceed fifteen or sixteen degrees. A great deal of nonsense is constantly spoken and written about the expense of hard water when used for the purpose of infusing tea and for washing. As regards the former, we have frequently said that hard water makes tea as well as soft, and even better, if people will be content with the pleasant infusion, and do not require a dark brown mess, with a flavour which, to our minds, is anything but agreeable. There is more to be said on the subject of washing; but even on this matter the waste of soap with hard water is grossly exaggerated. The Liverpool Water Committee will do well to mix the Bootle water and the Rivington water, so as to bring down, as far as possible, the hardness of the supply to North End and elsewhere.

Worcester, last Wednesday, was subjected to considerable inconvenience, in consequence of the bursting of a main, which left the inhabitants without water for the space of about ten hours, and this within the hours when the largest consumption is going on. Great wailings arose, and the inhabitants looked with regret on the wells which had been filled up in consequence of the sanitary fervour of their Medical Officer of Health. It does seem hard that people should be deprived of a home supply, which is constant, when a public supply may be disagreeably intermittent; but accidents will happen in the best regulated water undertakings, and the inhabitants of Worcester have suffered no more than other towns of equal importance.

The Local Board of Colne and the Water Company cannot agree as to the price to be paid for the undertaking of the latter. The former forget that undertakings of the kind, like the Sibylline books, constantly increase in value, and cannot understand how works, which they might not very long ago have purchased for £11,500, are now valued at £14,500. The reason is perfectly clear. In the interval, the Company have expended money, which bears a profit, and that capitalized, necessarily adds to the selling price of the concern. The Colne authorities have offered the Company £12,500 for the undertaking, a sum which we hope will be refused.

We are happy to find by later information that the Durham Water Company are not unmindful of the fact that it is their duty, as well as it is their interest, to seek out a new source of supply, the quality of which will satisfy their customers. It seems that immediately after the defeat of their Bill, the Directors, at a meeting on the 30th of July last, resolved on adopting another source, and we notice that arrangements are talked of between the Durham Water Company and the Weardale and Shildon Water Company.

General Scott's Sewage Cement Company are said to be making both ends meet at Burnley. They can produce five tons of cement per week, and it is further reported that they have sold five tons in Burnley. A statement made in the Town Council was to the effect that the Company might sell the whole of their produce in Manchester if they chose, and we should like to know why they do not choose to avail themselves of such an opportunity. A rather vague statement was also made in the Town Council as to the strength of the cement, but we do not quote it because it does not comply with the recognized modes of stating the strength of cements. There is a question of enlarging the Burnley Sewage Works, but there appears to be some dispute as to who is to do it—the Cement Company or the Corporation. The latter seem to have got to the end of their borrowing powers, and the former apparently have no available funds. Why does not the Duke of Sutherland come down handsomely? We do not advise Sir Henry Cole, C.B., to invest his hard earnings, or to mortgage his pension for the purpose, but we should really be glad if some one would find the money and have the question settled once and for all, whether or not sewage cement is good for anything or for nothing.

The pollution of rivers by manufacturers still continues, and is likely to continue for many years to come. Some people are impatient to have the provisions of the Rivers Pollutions Act brought into immediate operation; but, it is needless to say, that it would be extremely unjust to compel manufacturers, at short notice, to alter their system of disposing of their refuse. Grave complaints reach us of great pollutions of the Wyre and Calder. There are probably good foundations for these complaints, and it would be well if the paper manufacturers and others took precautions to keep their poisonous fluids out of the streams, or, at all events, endeavour to render their refuse innocuous. We care nothing about the destruction of fish, which are practically worthless, and only afford what is called sport to idle people; but the noxious mixture finds its way into the reservoirs which supply large communities and companies, and authorities are perfectly justified in remonstrating against a continuation of the nuisance. We are not at all anxious to see the provisions of the Rivers Pollutions Act arbitrarily enforced; but we put it to manufacturers whether the pollution cannot be prevented with profit to themselves.

MIDLAND ASSOCIATION OF GAS MANAGERS.—The third general meeting of this Association was held on Wednesday, the 14th inst., at the Talbot Hotel, Stourbridge, under the presidency of Mr. Charles Hunt, of Birmingham. The Secretary (Mr. John Tindall, of Walsall) read the minutes of the last general meeting. The President then called upon Mr. Storer to resume the discussion which was adjourned at the meeting held on the 2nd of May, in Birmingham, on the following subject:—"That Brick or Tile-built Ovens are more Durable and Economical than ordinary Clay Retorts." Mr. North followed, and after some very valuable facts and information had been given by the members present, the President summed up, and gave his opinion on the subject. The members then sat down to a sumptuous dinner, kindly provided by the Directors of the Stourbridge Gas Company, who had also undertaken to furnish conveyances to Enville, for the purpose of affording the members an opportunity of viewing the beautiful gardens and grounds of the Earl of Stamford and Warrington; but the unfavourable state of the weather prevented this part of the programme from being carried out.

FAVERSHAM GAS COMPANY.—The annual meeting of this Company was held on Wednesday last—Mr. W. E. Rigden in the chair. On the recommendation of the Directors, a dividend of £10 per cent. was declared, with the addition of a bonus of £2 on each share. The Directors were re-elected as follows, viz.:—Messrs. G. Prentis, F. B. Elvy, J. Tassell, W. E. Rigden, R. J. Hilton, J. A. Anderson, and S. Higham. Messrs. B. Adkins and H. Anderson, Auditors, were also re-elected. A recommendation of the Directors to reduce the price of gas to private consumers to 4s. per 1000 feet, subject to a further reduction of 3d. per 1000 for prompt payment, to take effect from the 1st of July last, was adopted, and it was further resolved that the charge for lighting the public lamps be also reduced.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

MR. METHVEN'S NEW STANDARD FOR DETERMINING THE ILLUMINATING POWER OF GAS.

SIR,—I am sorry that I am compelled to trouble you with a further communication on the above-named subject, especially as Mr. Methven deprecates further discussion. My reasons for now writing are—first, that Mr. Methven has altogether misunderstood the position which I took up—namely, that of a friendly critic reasoning upon his statements in conjunction with known facts; and, secondly, that his letter contains nothing which can be regarded as a logical reply, either to my reasonings, or to my suggestion for more information.

In my letter in your issue of the 6th inst., I said in effect: "Facts prove that flames of the same length produced from the combustion of gases of different qualities do not give equal light, and that, therefore, the quantity of light which will pass through the slit in Mr. Methven's screen cannot always be constant"—a position to which I adhere.

Mr. Methven replies that "he was hopeful that Mr. Hartley intended to enlighten us on the theory of the subject," forgetting, apparently, that, as a critic challenging a statement or theory, it formed no part of my duty at once to formulate another.

Mr. Methven next recapitulates part of the substance of his paper, and then says that, notwithstanding my "theory"—I not having propounded one—I have failed to establish my position. Further, he says that, if there are differences, "the photometer is not a sufficiently delicate instrument [by which] to determine the difference," which may or may not be true, but certainly this assertion is the only point of importance in his reply.

In another paragraph, my position as to the edge of an Argand flame being "all round" is admitted; but the remainder consists of a description of the form of an Argand flame, owing to my having rather loosely, and, as I admit, incorrectly called it by the current popular term, "a cylinder."

Again, overlooking the fact, that I specified the jet photometer "in all its varieties," and thereby used the most comprehensive expression possible to be employed, Mr. Methven proceeds to argue as though I had excluded the Argand from my considerations, and says, "It is constituted of a series of jets." Of course it is, and it not only can be, but *is* used in jet photometry. I fail, however, to see the value or force of his remarks on my admission that, "under certain conditions, the jet photometer is, for approximate determinations, a most valuable instrument." So it is, but an extended, exhaustive, and costly series of experiments require to be made before it can be elevated into the position of a standard test, which some day, when all the conditions are determined, it may become, possibly in connection with the eudiometer.

Mr. Methven lastly says: "Mr. Hartley does not attempt to explain his theory, neither does he establish any theory to prove that the constituent parts of the flame of 15-candle gas should vary from those of 35-candle gas." My answer again is, that it formed no part of my business to do so when commenting on the paper, and that Mr. Methven's own experiments show that there is a difference in light, whatever be the effect on the "constituent parts;" for if the zone of maximum luminosity be higher in one flame than in another, it follows, as it appears to me, that there must be a difference in the total values, even as there are differences in the parts. Hence I dispute that it can be literally true that slices (so to speak) cut out of the flames of different gases, at a fixed distance between apex and base, can be equal in lighting power.

F. W. HARTLEY.

55, *Millbank Street, Westminster, Aug.* 15, 1878.

THE EXHIBITION OF GAS APPARATUS AT WOLVERHAMPTON.

SIR,—You were good enough to notice, in a recent issue of your valuable paper, that a medal had been awarded to our firm at the Exhibition of Gas Apparatus at Wolverhampton, and we venture to trouble you with this to say that we and several other exhibitors have declined to receive our awards, on the ground of the utter incompetency of the judges, a specimen of whose work we give below.

In one class, in which a medal was offered for a stove with a boiler attached, the judges awarded it to a stove which had *no* boiler, and which was not in the Exhibition at the time of judging, and was therefore not seen by them.

In another class the award was given to a stove which was entered neither in the exhibitors nor the official catalogue; and the exhibitor, in writing to the Committee, stated that he considered it the worst stove in his exhibit, and one not intended for competition.

For gas-fires, two exhibitors were informed by the judges that there was no medal offered, while they awarded one to a third, that being the only fire they looked at.

For gas-baths no medal was awarded, the judges asserting to one exhibitor that they had no time to examine them, and to another that they did not feel themselves competent.

Of the stove for which a medal was awarded to us, we can only say that we had other stoves in the same class which were far superior, and there were other exhibits in the place that better deserved the award than ours did.

We could mention other matters, such as one exhibitor falsifying his prices to the judges, with a view to obtain prizes undeservedly; but the foregoing is sufficient, we think, to justify us in declining our awards.

The stoves were neither lighted nor tested, and the judge (a confectioner) who took the lead in the judging, when looking at our stoves, asked us what was a "Bunsen" or "Atmospheric" burner—a question which clearly shows his incapacity for the position he occupied.

On protesting to the Committee (of whom Alderman Edwardes was Chairman), a meeting was called, at which the exhibitors were present, when it was decided, with the consent of a large majority of exhibitors and prize-takers, that medals so awarded, being evidently worthless, the awards should be cancelled, and the Secretary offered to give £10 (the cost of the medals) to the Wolverhampton Hospital.

A letter to this effect was drawn up by the Committee, and was to have been sent to you for publication; but we are now informed that the original awards will stand as they did before our meeting with the Committee. We, therefore, wish publicly to withdraw our name from the prize list.

Your insertion of this will, perhaps, show to the public the value of the Wolverhampton medals, and warn them not to purchase a stove *solely* because it has obtained one.

JOHN WRIGHT AND CO.

Essex Works, Broad Street, Birmingham, Aug. 15, 1878.

GAS COMPANIES AND ALTERATIONS IN STREET LEVELS.

SIR,—A letter in your JOURNAL of Aug. 6, on the above subject, has been brought to my notice, and having had repeated cases of such alterations, I have always charged, and have been paid, every expense attending the same.

My first case (some years ago) was disputed, but when I brought forward the 71st clause of 11 & 12 Vict., cap. 63, the Public Health Act, the whole question was settled.

EDWD. H. THORMAN.

West Ham Gas-Works, Aug. 15, 1878.

STOPPAGES IN INLET-MAINS TO GASHOLDERS.

SIR,—I wonder if your correspondent, "7," has succeeded in removing the stoppage in his gasholder-main by the plan adopted by "A Belgian Gas Engineer," or by any other means.

At the time "7" wrote to you we were in the same disagreeable position as himself, and we also found that warm water was quite powerless to remove the obstruction. We are indebted to "A Belgian Gas Engineer" for his suggestion as to the use of petroleum and steam in the removal of our troublesome enemy, though we seem to have applied the same in a different manner to him. As it may interest some of your readers who have been, or may at some time be, afflicted with this pest—naphthaline in its wrong place—perhaps you will spare me a little of your space while I state how we removed the stoppage.

Acting on the suggestion of "A Belgian Gas Engineer," we obtained 30 gallons of petroleum, which we made as hot as we could with steam in buckets, and we poured this into the inlet-main by the syphon-tube. Knowing the capacity of our main and syphon, we found, by dipping, that the petroleum did not rise higher than the bend in the tank, but was several feet higher in the syphon-pipe. We then connected a ¾-inch steam-pipe to the syphon-tube, and turned on 40 lbs. pressure of steam. Nothing unusual occurred until the steam had been going in about half an hour, when we heard a rattle on the crown of the holder, as if a handful of gravel had been violently thrown on it. In a few minutes after, we found the manhole cover quite warm, and knew from this that there was a clear road for the steam, the force of which had carried petroleum, naphthaline, and everything else right through and into the tank. We pumped out what was left of the petroleum in the syphon—five or six gallons—turned on the gas, and found a clear road; the holder was six sheets out of water during the operation.

Query: Would water have answered the same purpose, if used in this way?

HIGH HEATS.

SIR,—For the information of your correspondent, "7," and others, I will, with your consent, give my experience with stopped inlets. Two years ago, my inlet pressure having increased from 25-10ths to 35-10ths, I filled up the inlet-pipe with cold water, and, having nailed sacks round the end of a scaffold-pole, plunged the inlet with it, forcing the water into the holder. The result was that the pressure was reduced to 25-10ths. Fourteen days ago, my inlet pressure having increased from 25-10ths to 35-10ths, I plunged it the same as before, and with like results. The pressure increased in 24 hours in each instance.

W. LATCHFORD.

Broadstairs, Aug. 14, 1878.

Parliamentary Intelligence.

HOUSE OF COMMONS.

TUESDAY, AUG. 13.

A copy was presented of the report by the Board of Trade of their proceedings under the Gas and Water Works Facilities Act, 1870, during the Session of 1878.

WEDNESDAY, AUG. 14.

METROPOLITAN WATER RATES.

Mr. FAWCETT asked the Chancellor of the Exchequer whether he could promise that the Government would next session introduce a measure to deal with what he lately described as the "enormously increased charges of the Metropolitan Water Companies."

The CHANCELLOR of the EXCHEQUER: This is a matter of importance, and one connected with a very large question. I am not able at present to give any positive promise on the subject; but undoubtedly it is a matter which requires the careful consideration of the Government.

Mr. FAWCETT gave notice that, in the event of the Government not taking any action in this matter, he should take the earliest opportunity next session of asking the House to express its opinion in reference to it, and of moving a resolution relating to it.

THURSDAY, AUG. 16.

METROPOLITAN WATER RATES.

Colonel NORTH gave notice that early next session he will call the attention of the House to the present system of the Metropolitan Water Supply and to the arbitrary powers of the various Water Companies with respect to the charges and rates levied by them; and move an humble address that Her Majesty will be graciously pleased to appoint a Royal Commission to inquire into the whole subject, with a view to some better system of supply being adopted, and at charges less burthensome to the inhabitants of the Metropolis than those at present enforced.

Colonel BERESFORD gave notice that early next session he will call attention to the enormous increase in the charges made by some of the Metropolitan Water Companies for the water supplied; and move a resolution.

GAS AND WATER WORKS FACILITIES ACT, 1870.

Proceedings under the Act during the Session of 1878.

The report by the Board of Trade of their proceedings under the "Gas and Water-Works Facilities Act, 1870," during the session of 1878, presented to Parliament last Tuesday, states that 25 notices of intended applications for Provisional Orders were deposited at the Board of Trade, in 1877 for the ensuing session, in respect of gas and water. Only 22 applications, however, were actually made to the Board of Trade—viz., 10 in respect of gas, 8 in respect of water, and 4 in respect of gas and water combined. Of the 10 applications in respect of gas, 9 were granted, and 1 was not proceeded with by the promoters. Of the 8 applications in respect of water, 7 were granted, and 1 was refused by the Board of Trade. Of the 4 applications in respect of gas and water combined, all were granted, but 1 was restricted to the power to construct water-works only.

The fees received with these applications were £35 each, and two public inquries were held by the direction of the Board of Trade.

Gas Orders.

There were ten applications for Gas Orders—viz., (1) Bognor, (2) Dysynni, (3) Elland-cum-Greetland, (4) Formby, (5) Godalming, (6) Greenhithe, (7) Sandown, (8) Shanklin, (9) Stratford-upon-Avon, (10) Weston-super-Mare. No. 4 was for the construction of new gas-works, and the manufacture and supply of gas; Nos. 2, 5, 6, 7, and 8, were for the maintenance and continuance and enlargement of existing works, with power of amalgamation in the case of No. 6; Nos. 1, 9, and 10, were for additional capital; and No. 3 for additional capital and construction of new works. No. 9 was not proceeded with by the promoters. All the other applications were granted by the Board of Trade.

Dysynni.—This Order, which was for power to maintain and continue existing works, was objected to by Mr. J. H. Jones, a landowner, who stated that the pipes of the Company had been laid over his land without his consent. It appeared to the Board of Trade that the only power which the promoters would acquire under the Order, with respect to the laying of pipes, was derived from the Gas-Works Clauses Act, 1847, under which they would be unable to enter on private land without the consent of the owner and occupier of such land, except for purposes of repair and alteration where pipes had been *lawfully* laid down under parliamentary powers, and that the question whether that consent had been given or not would not be determined by the granting of the Order. The Board of Trade accordingly granted an Order.

Elland-cum-Greetland.—In this case the Company, which was incorporated by Act of Parliament, applied for power to erect new works on land in the occupation of the Company, and to raise additional capital. The application was opposed by the Local Authority on the grounds that the Company had capitalized £7000 which they were authorized to borrow on mortgage, that the additional capital asked for was excessive, that the proposed standard price of 4s. 6d. for the purposes of the sliding scale of dividend was too high, and the illuminating power too low; they also objected to the creation of a reserve-fund, and wished to have power given them by the Order to purchase the gas-works. The application was also opposed by the Calder and Hebble Navigation, who wished to have a clause inserted in the Order for the protection of the navigation. The Board of Trade, however, did not consider it necessary to insert the clause. The Board of Trade saw no sufficient reason for refusing to grant an Order in this case; they, however, reduced the additional capital asked for from £35,000 to £25,000, and the borrowing powers in proportion. They also reduced the standard price for the purposes of the sliding scale (which was adopted in this case), from 4s. 6d. to 4s. per 1000 cubic feet, but provided that, in the event of any amount due to the promoters not being paid within one month after demand, they might demand, by way of fine, a sum equal to one-twentieth of such amount.

Formby.—This was an application to construct new gas-works and to supply gas in the township of Formby. The Corporation of Southport opposed on the ground that a portion of the proposed limits of supply was within the authorized limits of supply of the Corporation. The promoters contended that the Corporation were not then supplying any part of Formby with gas, and were unable to do so without erecting gas-works, and that they had failed to obtain land in Formby for that purpose. It appeared, however, to the Board of Trade that, without going further into the merits of the case, they were precluded by the Gas and Water Works Facilities Act, 1870, from granting an Order for the supply of gas in a district within the authorized limits of supply of any Company or Corporation without their consent. The Board of Trade accordingly granted an Order limiting the supply of gas to such portion of Formby as was not within the limits of supply of the Corporation, as defined by the Southport Improvement Acts of 1865 and 1871.

Greenhithe.—This was an application by a limited Company for an Order to maintain and continue existing gas-works; to supply the parish of Swancombe; and for powers to amalgamate with the Dartford Gas Company, incorporated by Act of Parliament. The application was opposed by Mr. W. G. Head, who was already supplying gas in a part of Swancombe within the proposed limits of supply, and who urged that the Order, if granted, would prevent his supplying gas to the houses which he at present supplied at a lower rate than was proposed by the Order. As Mr. Head had no parliamentary authority to supply gas, the Board of Trade were unable to refuse to grant the Order on the grounds that Mr. Head was supplying gas within the proposed limits. They accordingly granted an Order, excluding, however, from the limits of supply that portion of the parish supplied by Mr. Head, with a provision that from and after Sept. 1, 1879, the limits should comprise the whole parish of Swancombe, unless Mr. Head should by that date have obtained a Provisional Order from the Board of Trade with respect to his gas-works. The sliding scale of price and dividend were adopted by the promoters in this case, the standard price for such purpose being fixed by the Board of Trade at 5s. per 1000 cubic feet.

Sandown.—The application in this case was to maintain and continue the existing gas-works and to erect new works. It was opposed by certain trustees on the grounds that their premises would be depreciated in value, that the present works were a nuisance and annoyance to the neighbourhood, and that the new works should be at a greater distance from the premises of the trustees. It was represented to the Board of Trade that the site of the existing works had been offered by the Local Board, that no objections to it had been made by the inhabitants, and that the nuisance arose from the sewer pits of the Local Board adjoining the gas-works, which had been ordered to be removed. As the works had been established 15 years, and the new works were to be at a greater distance from the objectors land than the present works, and no other objection had been received, the Board of Trade saw no sufficient reason for refusing to grant an Order. The sliding scale of price and dividend were adopted by the promoters in this case, the standard price for such purpose being fixed by the Board of Trade at 6s. 6d. per 1000 cubic feet, with power to levy a fine of 1d. for every 1s. on accounts not paid within one month after demand.

Shanklin.—The same sliding scale of price and dividend as was approved in the Sandown Order was approved in this case.

General Observations.

The illuminating power of the gas is fixed in all cases at 14 candles.

The maximum price varies from 6s. to 7s. 6d. per 1000 cubic feet, except in the case of the Dysynni, where the maximum price is fixed at 8s. 4d.

The sliding scale of price and dividend were adopted by the promoters in four cases, as above mentioned.

The Orders contain the ordinary clauses with respect to sale of shares by auction and the other clauses which are generally introduced into Gas Acts.

The pressure of gas is fixed at 6-10ths of an inch by day, and 8-10ths by night.

Special authority is given to the Gas Examiner to open any road or street for the purpose of testing the pressure.

Water Orders.

There were eight applications for Water Orders, viz.:—(1) Alcester, (2) Bush Hill Park, (3) Cuckfield, Haywards Heath, and Lindfield, (4) Fowey, (5) Frith Hill, Godalming, and Farncombe, (6) Holywell and District, (7) Norwood (Middlesex) District, (8) Wokingham District. In each case the application was for power to construct new works. All the applications, with the exception of No. 2, were granted.

Bush Hill Park.—In this case the application was for power to supply water within the authorized limits of the New River Company, and was opposed by that Company. As the Board of Trade had no power to grant an order in such a case, they did not proceed further with the application.

Holywell and District.—This application was for authority to construct and maintain water-works and to supply Holywell Town, Brynford, Greenfield, Whelstone, Bagillt Fawr, and Bagillt Fechan. Objections were received from the Rural Sanitary Authority of Holywell Union, from owners and occupiers of lead, iron, and alkali works, collieries, breweries, &c., and from other inhabitants in Whelstone, Bagillt Fawr, and Bagillt Fechan, from inhabitants of Brynford, and from landowners and millowners, from the Holywell Local Board, and from the London and North-Western Railway Company. The promoters having agreed, after protracted negotiations, to strike out from the limits of supply the townships of Whelstone, Bagillt Fawr, and Bagillt Fechan, and to the insertion in the Order of certain provisions to carry out the wishes of the objectors, all opposition was ultimately withdrawn. The Order was accordingly granted (with the additional provisions asked for) for the supply of water to the Local Board District of Holywell, and to the townships of Brynford and Greenfield.

Gas and Water (Combined) Orders.

There were four applications for Gas and Water (Combined) Orders, viz.:—(1) Hoylake and West Kirby, (2) Newquay, (3) New Tredegar, (4) Walton-on-the-Naze. Nos. 1 and 2 were for the construction of new gas-works and water-works, and Nos. 3 and 4 for the maintenance and continuance of existing gas-works and water-works, and in the case of No. 4 for the erection of additional water-works. All the applications were granted by the Board of Trade, the gas powers in No. 2 being struck out.

Newquay.—In this case the Local Authority refused their consent to that portion of the undertaking which related to gas, and a certain millowner and mill-occupier opposed the portion which related to water. The opposition with respect to the water undertaking having been withdrawn, the Board of Trade granted the Order, striking out the powers relating to the supply of gas.

Walton-on-the-Naze.—In this case the Board of Trade dispensed with the consent of one of the Local Authorities, and made a report, which was laid before both Houses of Parliament on the 8th of April.*

A Bill to confirm the Gas and Water Orders was introduced into the House of Commons on the 15th of April. There was no opposition in either House of Parliament, and the Bill received the Royal Assent on the 17th of June.

Miscellaneous News.

DUNDEE GAS COMMISSION.

At the Annual Meeting of the Members of this Commission—Bailie Robertson in the chair—the accounts for the year ending the 30th of April last having been presented,

Mr. James Mitchell, the Convener of the Finance Committee, said: The year 1877-8 was commenced with a balance in our favour of £1964 2s. 2d. The estimated revenue from the sale of gas was put down at £51,786 15s., while the actual sum realized was £54,858 9s. 2d., showing an increase of revenue in this department of £3071 14s. 2d. The chemical products and coke were estimated to yield a sum of £5075 10s. 3d., instead of which the revenue from these sources was £5756 15s., showing an increase of £681 4s. 9d.—making a total increase of the actual revenue, over that estimated, of £3752 18s. 11d. This large increase of revenue is consequent on the increased consumption of gas throughout the town and suburbs, the actual quantity of gas sold being 263,677,300 cubic feet. This quantity exceeded the estimated consumption by 15,177,300 feet, and was obtained at the small increase of £29 16s. 4d. in the charge for coal (on which a saving during the year was made of 8d. per ton), as well as by an increased produce of gas from the coal carbonized. In the estimate the price of the coal, including wages, &c., was £1 4s. 3½d. per ton, and the produce 10,800 cubic feet of gas per ton; whereas the actual price of the coal, including wages, was £1 3s. 7½d., and the produce 11,052 cubic feet of gas per ton, which made a saving of £1798 on the year. The total estimated expenditure was £58,698 10s. 10d., and the actual expenditure £59,447 19s., showing an increase on the actual accounts of £749 8s. 2d. The result, therefore, of the working of the Commission is that we closed the year ending the 30th of April last with a surplus of £3131 7s. 4d. This highly satisfactory result has not been obtained at the expense of starving or impoverishing any department of the works, or by lowering the illuminating power of the gas, which has been kept at an average of 27 candles during the year, but is largely owing to the efficient management of Mr. M'Crae, whose skill as a Gas Engineer, whose attention to every detail in connection with the work, and whose indefatigable energy and power for work every one of us has ample opportunity of observing. To him, therefore, and to Mr. Maxwell, the Works Convener, who ably assists and co-operates with Mr. M'Crae, the public are chiefly indebted for the result to which I allude. It was found desirable and needful, in view of contemplated improvements and additions to the works of an extensive and important character, to apply to Parliament in the year 1877 for an Act giving us additional borrowing powers, which Act was passed, authorizing the Commissioners to borrow to the extent of £100,000, which, added to the amounts authorized under the Dundee Gas Act, 1868, and the Dundee Gas Amendment Act, 1872, brings up the amount authorized to be borrowed to £200,000. Of this sum £106,562 10s. has been lent to the Commission on mortgage at 4 per cent. per annum. In addition to this, £10,085 has been deposited with the Treasurer on receipt. This plan was adopted last year for the purpose of enabling small lenders to receive a

* This report was given in the Journal of May 21 last, Vol. xxxi., p. 798.

higher rate of interest than is generally paid by banks, along with security of an undoubted character. The large sum of £10,000 has been lent to us, mostly in small sums, within the short space of six months. Large amounts are also lent to the Police and Water Commissions of the town, on the same principle. At the beginning of the year the amount expended on capital account was £98,571 8s. 10d., which was increased during the year by £13,929 9s. 10d., made up chiefly as follows:—Lochee boundary wall and tank, £3154 14s. 4d.; Lochee gasholder, £1684 10s. 8d.; new gas-meters, £1490 9s. 10d.; high-level main, for supplying more efficiently the higher parts of the town, £2179 6s. 8d.; scrubbers, £2513 11s. 6d. I may state that these are the only scrubbers of this kind (Mann and Walker's patent) in Scotland; and the experience of Mr. M'Crae is that, so far as they have been in operation, now seven months, they have extracted every trace of ammonia from the gas, thereby improving its quality and purity, and, the ammonia being a valuable product, the revenue from that source has been increased by £500. We now come to the estimate for the year, which commenced on the 1st of May last. It has been thought desirable, in the present state of trade in our town, not to reckon on a large increase in the consumption of gas during the year. This increase has, therefore, been put down at only 2,622,000 cubic feet, the quantity sold last year being 263,677,300 cubic feet. To produce this quantity, along with 2,500,000 feet used at the works, as well as the 51,210,000 feet caused by leakage, &c., 29,091 tons of coals, it is estimated, will be required. For these we have contracted on very favourable terms, the average price per ton being 18s. delivered at the works. The total cost of coal and wages is estimated to be £32,000, which is £1738 5s. 2d. under that paid for the same last year. Under the head of "Refuse," we estimate that £500 will be required, being an increase over last year of £312 1s. 2d. This sum is simply for carting and labour in connection with the refuse of the works, the same being increased by some of the coals for which we have contracted being not coke-producing coals. Under interest on mortgages and loans, an increase is reckoned of £631 3s. 8d., consequent on the increased amount of money borrowed. To the contingent-fund we contemplate setting aside the sum of £1489 19s., instead of £500 last year. This has been thought desirable in view of increasing and improving the workshop and the store accommodation. The total expenditure we, therefore, reckon at £58,906 14s. 4d., which makes ample allowance for keeping up the works to a proper standard of efficiency. To meet this expenditure we estimate our revenue as follows:—Balance from last year, £3131 7s. 4d.; from the sale of gas, £52,176 13s. 4d.; from the sale of chemical products, £3290; and from the sale of coke, £1000. Both of the latter sums show a falling off from the previous year. This is accounted for by the fact that the price of the secondary products has fallen very much of late, with the exception of ammonia, and with no appearance of a speedy rise in value. The result, therefore, of the estimates is that the gas will be charged to the consumers in Dundee at 3s. 11d. per 1000 cubic feet; to the consumers at Harecraig and Invergowrie, 4s. 11d.; to the consumers at Downfield, 5s. 8d.—all subject to discount at the rate of 5 per cent., if paid within 28 days after the accounts are rendered; and to the Police Commissioners, for the public lamps, at 3s. 8½d., without discount, which is a reduction from last year of 3d. per 1000 feet; and, further, that the secondary products be sold at the market price of the day. I may here remark that the plan adopted some time ago of allowing 5 per cent. discount has worked remarkably well. Over £2000 was allowed as discount last year, which shows that fully 75 per cent. of the gas is paid for prompt; and the great care and watchfulness exercised by the Treasurer and Collectors have reduced the bad debts to a minimum—the sum under this head for the year being under £200, or about 7s. 6d. for every £100 of revenue collected. This is a very gratifying result, gratifying alike to us as Commissioners, as well as to the public, who have now the satisfaction of knowing that they are being supplied with gas of the finest quality at a price, so far as I know, cheaper than that supplied to any other town in Scotland. I have now formally to move the adoption of the estimate, and before sitting down I take this opportunity of bearing testimony to the zeal and diligence of the various officials with whom I have come into contact, more especially our Treasurer, Mr. Matthew, who is in every way so well qualified for his important post, and whose correctness, even in the smallest details, renders my post as Finance Convener a very easy one indeed. I think the Gas Commissioners are highly fortunate in having at the heads of the various departments such gentlemen as Mr. Matthew and Mr. M'Crae—of sterling integrity and unimpeachable probity, and also in having under these gentlemen a staff of workers, each one of whom does his best conscientiously to render the Commission that success which we see it has attained.

Mr. Alexander Maxwell seconded the motion. He said: After the clear statement which has been made, it is unnecessary for me to say anything regarding the general financial results of the gas undertaking during the past year. I think they may be considered satisfactory when we find ourselves able, after providing for all useful and proper repairs, and also placing in the contingent-fund the largest amount allowed by statute, to propose that the price of gas be reduced 3d., making it, after discount, 3s. 8½d. per 1000 cubic feet. This is the lowest rate which we yet have reached, and is below that of any other gas-works in Scotland. But I feel quite satisfied, not only that the reduction is wise and proper, but that in all probability by another year a rate even lower may be arrived at. The gas produced last year was 316 million feet, being an increase over the previous year of 23½ millions, and over the year 1870—the first after the Commissioners acquired the works, when the production was 201 millions—of 115 millions, equal to 57 per cent. The consumption during the same period has increased in even a greater ratio than the production. In 1870 it was 152 millions, and in the past year it was 265½, being an increase of 113½ millions, equal to 74 per cent. The discrepancy between these rates is due to the decrease in waste or unaccounted-for gas, which last year, by improvements in pipes and the equalizing of pressure, was reduced to 15·9 per cent., as against 24·2 per cent. at the earlier period; showing that while the consumption has increased 113½ millions, the quantity of unaccounted-for gas has only increased about 1½ millions. During last year each ton of coals used produced 11,052 feet of gas, and indicated at the consumers meters the large amount of 9292 feet, a quantity which may be considered highly satisfactory, and which, so far as I am aware, has not been exceeded at any gas-works. Some important additions to the plant were made during last year. The Mann and Walker's patent scrubbers which, with other apparatus, were erected during last autumn, have already been proved to be most efficient and advantageous. The gas is now singularly pure, having no trace of ammonia, a substance offensive in combustion and deleterious to health, and I think the consumers quite appreciate the increased brilliancy of flame and freedom from evil odours. It is satisfactory to find that this improvement has been effected without expense, the value of the additional quantity of sulphate of ammonia now produced being sufficient to pay the cost of the scrubbers, principal and interest, in six years. In all the improvements, and in everything that can forward the interest of the works, I need not say to you that Mr. M'Crae is untiring in the energy and attention which have already done so much to promote the success of our undertaking. I think that it is proper to place before you a statement showing how the interest of the gas consumers has been affected by the transfer of the undertaking to a public board. You are aware that the old Companies were authorized by Act of Parliament to sell gas at a rate equal to the average of the price in Edinburgh, Glasgow, Paisley, Aberdeen, Perth, Arbroath, and Montrose. The highest price was invariably exacted; the general body of consumers received no discount, that being given only upon the largest accounts. I have a return showing the price of gas in each of these seven towns for the last nine years, the annual average of which is the proper standard wherewith to compare our own. From this I find—

Year.	Average Price in Seven Towns.	Price in Dundee.	Being below Average.	Gain to Consumers.
1870	5s. 3½d.	4s. 9d.	0s. 6½d.	£4,065
1871	4 11	4 3 5-16	0 7 11-16	5,393
1872	4 9	3 11½	0 9½	7,490
1873	5 0½	3 11½	1 1	11,001
1874	5 10	5 8½	0 1½	1,341
1875	5 9½	4 4½	0 5½	4,652
1876	5 1½	4 9	0 4½	4,320
1877	4 9½	4 2½	0 7½	7,189
1878	4 7½	3 11½	0 8	8,789
			Total . . .	£54,240

The discount given by the Companies upon the large accounts would, during these nine years, have been received by 160 consumers, and would have amounted to £13,380, which, deducted from the above sum, leaves £40,860. To this is to be added the sum of £10,712, being the amount applied to and laid aside for the redemption of mortgages and annuities, making a total of £51,572, which has been realized to the consumers and to the community by the transfer of the gas undertaking.

The accounts and estimates were then approved.

THE GASLIGHT AND COKE COMPANY.

The Half-Yearly Meeting of this Company was held on Friday last, at the Offices, Horseferry Road, Westminster—the Hon. Richard Howe Browne (the Governor) in the chair.

The minutes of the previous meeting were confirmed.

The Secretary (Mr. J. Orwell Phillips) read the following report:—

The Directors have the pleasure to lay before the Proprietors the usual accounts for the half year ended on the 30th of June last.

Their proceedings during that period have been marked by no striking events, and afford but little subject of comment. The Company's manufacturing stations are all being brought up to, and maintained at, a modern standard of capability. The works at Beckton for the utilization of products are approaching completion, and coal contracts at favourable rates have been made for two years in advance.

In the opinion of the Directors, it is therefore unnecessary to do more than to announce that, having provided for all the preferential charges and the respective maximum parliamentary dividends on the B and H stocks, they recommend the payment, out of the surplus, of a dividend on the ordinary stock, at the rate of 10 per cent. per annum.

No. 1.—STATEMENT OF STOCK AND SHARE CAPITAL, *on June* 30, 1878.

Acts of Parliament relating to the raising of Capital.	Description of Capital.	Standard Dividend.	Number of Shares issued.	Nominal Amount of Shares.	Called up per Share.	Total paid up.	Arrears of Calls.	Remaining to be called up and unissued.	Total Amount authorized.
									£
The Gaslight and Coke Company's Act, 1868	A Ordinary stock	10 per cent.	..	..	..	£1,536,300	..	..	
	A Preference convertible stock, 1st issue	5 ,,	..	..	..	2,140	..	..	
	Ditto, 2nd issue	Ditto.	..	..	..	2,410	..	..	1,550,000
	A Preference convertible shares, 3rd issue	Ditto.	915	£10	£10	9,150	..	..	
The Gaslight and Coke Company's Act, 1872	Ditto, 4th issue	Ditto.	50,000	10	10	500,000	..	..	
	Ditto, 5th issue	Ditto.	50,000	10	6	300,000	..	£200,000	1,000,000
The Victoria Docks Gas Act, 1857	A Ordinary stock	10 per cent.	..	..	..	100,000	..	..	100,000
The City of London Gas Company's Act, 1859	A ,, ,,	Ditto.	..	..	..	300,000	..	..	
	B Stock	4 per cent.	..	..	..	100,000	..	..	400,000
The Companies Act, 1862, as applied to the Western Gaslight Company, Limited	A Ordinary stock	10 ,,	..	..	..	600,000	..	..	600,000
The Imperial Gas Act, 1854	A ,, ,,	Ditto.	..	..	..	1,560,000	..	..	1,560,000
The Great Central Gas Consumers Act, 1851	C Preference stock	Ditto.	..	..	..	200,000	..	..	200,000
The Equitable Gaslight Company's Act, 1842	D ,, ,,	Ditto.	..	..	..	300,000	..	..	300,000
	E ,, ,,	Ditto.	..	..	..	165,000	..	..	
The Independent Gaslight and Coke Co.'s Act, 1864	F ,, ,,	5 per cent.	..	..	..	30,000	..	..	235,000
	G ,, ,,	7½ ,,	..	..	..	60,000	..	..	
The Imperial Gas Act, 1866	H Stock	7 ,,	..	..	..	325,000	..	..	325,000
The Imperial Gas Act, 1869	Ditto	Ditto.	..	..	..	975,000	..	..	975,000
The Gaslight and Coke Company Act, 1876	..	10 per cent.	..	..	..	..	..	1,000,000	1,000,000
						£7,065,000	..	£1,200,000	£8,265,000

No. 2.—STATEMENT OF LOAN CAPITAL.

Acts of Parliament authorising the Loan Capital.	Total Amount authorized.	Description of Loan.	Rates per Cent. of Interest. 4 per Cent.	4½ per Cent.	4¾ per Cent.	4½ per Cent.	10 per Cent.	Total Amount borrowed.	Remaining to be borrowed.
The Gaslight and Coke Company's Act, 1868	£462,500	Debentures.	£7,300	£20,000	£110,000	£371,850	..	£1,561,500	..
The City of London Gas Company's Act, 1859	60,000	Debenture stock.	607,000	..	50,000	265,350	..		
The Great Central Gas Consumers Act, 1851	66,000	Bonds for capitalized profits.	..	..	..	..	£130,000		
The Victoria Docks Gas Act, 1857	25,000								
The Companies Act, 1862, as applied to the Western Gaslight Company, Limited	200,000								
The Imperial Gas Act, 1854	173,000								
The Imperial Gas Act, 1866	81,250								
The Imperial Gas Act, 1869	243,750								
The Gaslight and Coke Company's Act, 1872	250,000								
The Gaslight and Coke Company Act, 1876	1,000,000	..	..	..	..	..	..	..	1,000,000
	£2,561,500		£614,300	£20,000	£160,000	£637,200	£130,000	£1,561,500	£1,000,000

No. 3.—CAPITAL ACCOUNT.

Dr. *Cr.*

	Expended this Half Year.	Total Expenditure to June 30, 1878.		Receipts to Dec. 31, 1877.	Received since that date.	Total Receipts to June 30, 1878.
	£ s. d.	£ s. d.		£ s. d.	£ s. d.	£ s. d.
To Expenditure to Dec. 31, 1877	..	7,979,337 1 2	By A Ordinary stock	4,095,820 0 0		4,096,360 0 0
Expenditure during half year to June 30, 1878—viz.:			A 5 per cent. preference convertible stock	2,140 0 0		2,140 0 0
Lands acquired, including law charges	2,605 19 2		A 5 per cent. preference convertible stock, 2nd issue	*2,530 0 0	..	2,410 0 0
Buildings and machinery in extension of works	115,064 1 11		A 5 per cent. preference shares, 3rd issue	*9,510 0 0		9,150 0 0
New and additional mains and service-pipes	67,708 11 9		A 5 per cent. preference shares, 4th issue	500,000 0 0	..	500,000 0 0
New and additional meters	6,334 9 6		A 5 per cent. preference shares, 5th issue	198,854 0 0	101,146 0 0	300,000 0 0
		191,713 2 4	B 4 per cent. maximum stock	100,000 0 0	..	100,000 0 0
			C 10 per cent. preference stock	200,000 0 0	..	200,000 0 0
			D 10 " " "	300,000 0 0	..	300,000 0 0
			E 10 " " "	165,000 0 0	..	165,000 0 0
			F 5 " " "	30,000 0 0	..	30,000 0 0
			G 7½ " " "	60,000 0 0	..	60,000 0 0
			H 7 per cent. maximum stock	1,300,000 0 0	..	1,300,000 0 0
			Debentures	+636,950 0 0		509,150 0 0
			Debenture stock, 4½ per cent.	265,350 0 0	..	265,350 0 0
			" " 4¾ "	50,000 0 0		50,000 0 0
			" " 4 "	+354,200 0 0	125,000 0 0	607,000 0 0
			Bonds for capitalized profits	130,000 0 0	..	130,000 0 0
		8,171,050 3 6		8,400,354 0 0	226,146 0 0	
To Balance of capital account		455,449 16 6				
		8,626,500 0 0				8,626,500 0 0

* £480 of these issues have been converted into ordinary stock during the half year.

† Debentures, amounting to £127,800, have been exchanged for 4 per cent. debenture stock during the half year.

No. 4.—REVENUE ACCOUNT.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Manufacture of gas—			By Sale of gas—		
Coals, including dues, carriage, unloading, and trimming (see Account No. 9)	428,262 16 7		Common gas, per meter, at 3s. 6d. per 1000 cubic feet	803,704 2 9	
Salaries of Engineers and other Officers at works	7,951 17 8		Cannel gas, per meter, at 4s. 4d. per 1000 cubic feet	53,170 16 6	
Wages (carbonizing)	78,770 12 9		Cannel gas, sold in bulk, at 3s. 5d. per 1000 cubic feet	4,923 2 6	
Purification, including £12,626 2s. 0d. for labour	24,387 5 8		Public lighting and under contracts—		
Repair and maintenance of works and plant, materials and labour; less received for old materials, £2630 13s. 5d.	123,388 13 1		Common gas	58,361 6 7	
		662,761 5 9	Cannel gas	4,872 14 7	
Distribution of gas—			(See Statement No. 11)		925,032 2 11
Salaries and wages of Officers (including Rental Clerks)	17,779 16 8		Rental of meters	..	17,571 19 5
Repair, maintenance, and renewal of mains and service-pipes	35,288 3 3		Residual products—		
Repairs and renewals of meters	15,469 6 4		Coke, less £19,573 0s. 4d. for labour, &c.	138,627 6 10	
		68,537 6 3	Breeze, less £1942 4s. 8d. for ditto	2,102 8 2	
Public lamps—			Tar, less £362 3s. 3d. for ditto	50,285 19 7	
Lighting and repairing	..	10,605 7 1	Ammoniacal liquor, less £358 13s. 4d. for ditto	49,169 6 0	
					240,185 0 7
Rents, rates, and taxes—			Rents receivable	..	2,268 13 4
Rents payable	5,471 0 10		Transfer fees	..	188 15 0
Rates and taxes	34,361 18 11		Canteen account	..	68 2 4
		39,832 19 9			
Management—					
Directors allowance	3,750 0 0				
Company's Auditors	250 0 0				
Salaries of Secretary, Accountant, and Clerks	5,753 5 9				
Collectors commission	11,666 1 4				
Stationery and printing	4,884 4 7				
General charges	1,647 15 5				
		27,951 7 1			
Law charges	..	1,105 4 10			
Bad debts	..	3,287 15 10			
Depreciation-fund, for works on leasehold lands	..	750 0 0			
Superannuation allowances under amalgamation schemes, and annuities	..	8,748 11 6			
Public officers—					
Gas Referees and Official Auditor	886 1 0				
Public testing-stations	73 1 0				
		959 2 0			
		824,539 0 1			
Balance carried to net revenue account (No. 5)	..	360,775 13 6			
		1,185,314 13 7			1,185,314 13 7

No. 5.—NET REVENUE ACCOUNT.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Interest on debentures, debenture stocks, and bonds, accrued to June 30, 1878	..	35,920 7 5	By Balance from last account	..	326,536 16 2
Dividend on A 5 per cent. preference shares and stock	19,509 3 4		Less dividend on ordinary capital for the half year to Dec. 31, 1877	204,865 0 0	
Dividend on B stock, at 4 per cent.	2,000 0 0		Amount carried to reserve-fund for the year 1877	30,640 19 6	
" C " 10 "	10,000 0 0				235,505 19 6
" D " 10 "	15,000 0 0				91,030 16 8
" E " 10 "	8,250 0 0		Revenue account (No. 4)	..	360,775 13 6
" F " 5 "	750 0 0		Dividend from the estate of Benjamin Higgs	..	13 11 10
" G " 7½ "	2,250 0 0				
" H " 7 "	45,500 0 0				
		103,259 3 4			
Interest on temporary loans	..	252 10 10			
Balance applicable to dividend on the ordinary stock	..	312,388 0 5			
		451,820 2 0			451,820 2 0

No. 6.—RESERVE-FUND ACCOUNT.

Balance, June 30, 1878	£135,665 19 5	Balance, Dec. 31, 1877	£103,382 5 4
		Interest on amount invested	1,642 14 7
		Net revenue	30,640 19 6
	£135,665 19 5		£135,665 19 5

No. 7.—INSURANCE-FUND ACCOUNT.

Balance, June 30, 1878	£73,112 10 1	Balance, Dec. 31, 1877	£71,973 11 7
		Interest on amount invested	1,138 18 6
	£73,112 10 1		£73,112 10 1

No. 8.—DEPRECIATION-FUND ACCOUNT (FOR WORKS ON LEASEHOLD LANDS).

Balance, June 30, 1878	£10,606 7 3	Balance, Dec. 31, 1877	£9,704 9 6
		Amount brought from revenue account for the half year	750 0 0
		Interest on amount invested	151 17 9
	£10,606 7 3		£10,606 7 3

No. 9.—STATEMENT OF COALS USED, ETC.

Description of Coal.	In Store, Dec. 31, 1877.	Received during Half Year.	Carbonized during Half Year.	Used during Half Year.	In Store, June 30, 1878.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	118,210	448,600	505,538	371	60,901
Cannel	17,594	26,169	34,826	..	8,937

No. 10.—STATEMENT OF RESIDUAL PRODUCTS.

Description of Residual.	In Store, Dec. 31, 1877.	Made during Half Year.	Used in Manufacture during Half Year.	Sold during Half Year.	In Store, June 30, 1878.
Coke—chaldrons	41,752	505,663	135,940	358,602	52,873
Breeze—chaldrons	1,664	51,017	..	51,840	841
Tar—gallons	1,331,533	5,674,782	..	5,724,940	1,281,375
Ammoniacal liquor—butts of 108 gallons	9,814	157,903	..	162,373	5,344

No. 11.—STATEMENT OF GAS MADE, SOLD, ETC.

Description of Gas.	Quantity Made (part measured).	Quantity Sold. Public Lights and under Contracts (estimated).	Quantity Sold. Private Lights (per Meter).	Quantity Sold. Total Quantity Sold.	Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lamps.
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	5,294,692	279,563	4,592,593	4,872,156	70,436	4,942,592	351,500	31,828
Cannel	297,412	17,548	*274,222	291,770	1,159	292,929	4,483	3,353

* This includes the quantity sold in bulk.

GENERAL BALANCE-SHEET.

	£ s. d.		£ s. d.	£ s. d.
To Capital—		**By Cash at bankers**	..	65,024 8 10
Balance at credit thereof (Account No. 3)	455,449 16 6	Amount on deposit at interest	..	300,000 0 0
Net revenue—		Amount invested—		
Balance at credit thereof (Account No. 5)	312,388 0 5	Reduced Three per Cent. Consols	135,665 19 5	
Reserve-fund account—		Three per Cent. Consols	73,112 10 1	
Balance at credit thereof (Account No. 6)	135,665 19 5	New Three per Cent. Consols	10,606 7 3	
Insurance-fund account—				219,384 16 9
Balance at credit thereof (Account No. 7)	73,112 10 1	Stores on hand, viz.—		
Depreciation-fund account—		Coals	60,798 15 3	
Balance at credit thereof (Account No. 8)	10,606 7 3	Coke	17,497 2 0	
Debenture interest for amount due to June 30, 1878	27,866 18 7	Tar and ammoniacal liquor	12,656 9 7	
Bond interest for amount due to ditto	6,300 0 0	Sundry stores	105,476 13 3	
Preference dividends for amount due to ditto	103,259 3 4			196,429 0 1
Unclaimed dividends	5,754 18 7	Accounts due to the Company, viz.—		
Sundry tradesmen and others, for amount due for coals, stores, and sundries	143,565 15 9	Gas and meter rental—		
Benevolent-fund	1,565 7 6	Quarter ending June 30, 1878	376,041 9 8	
		Arrears outstanding	20,317 8 6	
				396,358 18 2
		Coke and other residual products	39,897 6 4	
		Sundry accounts	34,855 7 3	
				74,752 13 7
		Retiring allowances	..	23,785 0 0
	1,275,734 17 5			1,275,734 17 5

The GOVERNOR, in moving the adoption of the report, said: Ladies and Gentlemen, if I were to confine myself to the very narrow limits of the subjects contained in the report, I should have to detain you a very few moments; but those who make it a practice to attend here upon these occasions are well aware that they are accustomed to hear from the chair a more detailed and specific account of the transactions of the Company, its present position, and its future prospects; and I shall adhere, upon the present occasion, to the practice which has always obtained so long as I have filled the chair, and in the time of my predecessors, and endeavour to make you, the Proprietors, as conversant with the affairs of the Company as are the gentlemen who sit on this side of the table. There are one or two matters that are totally without the report, but of great interest to the Proprietors generally, to which I shall presently allude; but before referring to them, I will make a few remarks upon the points that are alluded to in the report. I think one of the most satisfactory things there announced is the uniform manner in which our carbonizing—I may say our work generally—has been carried on. At the time of the various amalgamations with which this Company have been concerned, it was found that there was a serious discrepancy in the workings of the different stations under our control. I am happy to say that, by a system which has worked most admirably—that is, encouraging the principle of emulation between the Engineers who have the conduct of our numerous stations—we have worked up the produce of gas per ton of coal to a very uniform and satisfactory state. Some years ago we were contented and pleased to see the manufacture of gas amount to 8000 or 9000 feet per ton of coals; whereas now (as I shall present)y show you when I bring some statistical remarks before you) we are making an average of 10,300 feet per ton. The works at Beckton for the utilization of our residual products—that is, for the manufacture of sulphate and for the distillation of tar—are making most satisfactory progress. It was my duty yesterday to visit the Beckton station officially—we do this periodically, as what we call a Committee of Supervision—and my colleagues and myself were most thoroughly pleased and satisfied with the very great progress of the works, and the admirable manner in which they are being carried out. I trust that in the month of March next, at the latest, these works will be in partial operation—I will not say in full operation, because we are not going to commence all at once, and involve ourselves in any difficulties with the enormous quantity of materials which will come under operation there. We intend to begin gradually, and to feel our way; but I have not the smallest doubt in my own mind that the works will tend greatly to the advantage of the Company, and will prove a most admirable investment of your capital. The works are estimated to cost something under £100,000, and from calculations that we have gone into, and that we went into before we undertook the works at all, I am fully convinced that the capital will turn out as productive as, if not more so than any capital that has been expended in this Company. With regard to the coal contracts, which we have been able to enter into for (extraordinary to say) two years to come, they have been of a most satisfactory nature; and I think that the Company, considering the enormous quantity of coals that it annually consumes, has reason to congratulate itself upon being perfectly safe for the next two or three years. Gentlemen must not ask me the price at which we have made these contracts; they must take it from my mouth that they are completely to the satisfaction of the Board, and will be productive of a very great saving for the next two years. Now, gentlemen, I will touch for a few moments upon the accounts, which I must ask you to take as read, for they are very voluminous. They have been in your hands some time, and you have had plenty of time to digest them and come to any conclusions you think proper upon them. But I will mention them for one reason. At the last meeting a great deal of our time was taken up in a very useless discussion as to the form in which these accounts are rendered to the Proprietors. Now, once for all, I would inform you, particularly those gentlemen who are here for the first time, that the Directors have no control whatever over the form in which they are rendered. The Board of Trade have fixed a hard and fast line, from which we cannot depart; and I can assure you the accounts which are now laid before you are drawn out in strict conformity with those regulations, not diverging from them in the smallest particular. As to the correctness of the accounts, you must form your own judgments. They have been audited, in the first place, by your own Auditors, the gentlemen whom you re-elected at the last half-yearly meeting—gentlemen fully competent to examine accounts, and form a right judgment, and check them; they have then been submitted to the Official Auditor of the Board of Trade, Mr. Parkes, whose certificate as to their correctness is appended to them; and they have finally been examined and approved by myself, and I have affixed my signature as confirming the signatures of our own Auditors, and of the Official Auditor. Therefore we may take it for granted that the accounts, having passed through these crucial tests, are perfectly correct; and I do not think the Proprietors will do wrong in taking them as read, without further entering into the question of figures. Gentlemen, we shall find it necessary, on the 1st of October, to make a call upon the fifth issue of the 5 per cent. preference shares, making £8 paid out of £10. I will say nothing about any other call, nor will I bind myself to mention any time for it; but for our requirements this year we shall need a call to be made on the 1st of next October, and I am sure the Proprietors will be very glad indeed, if not very anxious, to pay it up. Now, gentlemen, I will allude to another point, and I do so as illustrating a question which I shall by-and-by bring before you—that is, the question of amalgamations. I have been in this Company now for some 24 years, and when I joined it the old Chartered Company were working with a paid-up capital of considerably under £1,000,000. We have now, by our recent amalgamations, increased from time to time, as you know, from that figure to one which is a very large one—upwards of eight or nine millions of paid-up capital. Some years ago we were charging for common gas at the rate of 4s. 6d. per 1000 feet, and 6s. for cannel gas, and we were paying—I am going back many years ago—6 per cent. Our present position is this: We are charging 4s. 6d. per 1000 feet for cannel gas, and 3s. 6d. for common gas, showing a very marked diminution in the cost to the public. I have always advocated amalgamations ever since I have been on this Board. I have seen the benefit of them to the Shareholders, I have seen the benefit of them to the Public, and I do not think it requires any other argument to be adduced to substantiate my opinion than that which I have just mentioned to you. By-and-by I shall refer more particularly to it, but I am fully convinced in my own mind that this great reduction has been achieved, and the prosperity and solidity of the Company enhanced by the various amalgamations which have been so very properly entered into by the Board, and sanctioned by yourselves and the Board of Trade. Gentlemen, since we last met here, two of our oldest servants, who were

pensioners of this Company, have passed away, and I am sure it will be satisfactory to their relatives if some notice is taken from the chair of the loss which their families have sustained by their removal. I allude to Mr. Bush, who was for many years Chief Accountant of the old Chartered Gas Company, and who only retired a few years ago; and to Mr. Millar, the respected Secretary of the old City of London Gas Company. Both of these gentlemen have passed away within the last few months. Strange to say, neither of them accepted the commutation which was offered to all persons retiring upon pension; they preferred to live at ease upon a very substantial pension, to commuting their pensions. I can only say, as regards the feelings of the Board towards these two gentlemen, that they have always been of the most friendly description, and no one could have valued their services more than the present Board of Directors. Now, gentlemen, I come to a point which, I dare say, many of you have anticipated that I should mention; and as it has attracted a great deal of attention out of doors, I think you are entitled to possess the same amount of information as the Board possess as to the probability or the possibility of electric lighting superseding the present mode of illumination by gas. It has been the duty of the Board—and they have left no stone unturned in coming to the truth—to endeavour to form a just conclusion as to the merits of this new mode of illumination. They have directed their attention to it on various occasions; they have given it, even in this room, a fair trial; and it is the opinion of the Board, and it is my own firm conviction, that the proprietors of gas property have not the slightest reason to apprehend any diminution in their profits by the introduction of the electric light. I made some remarks on this subject at the last meeting, and at the meeting before—remarks which were most freely commented upon, and in the most friendly manner of approval, by the Press. I think it necessary to say that nothing has occurred since I made those remarks to alter my opinion as to the possibility of applying the electric light. We are quite aware that in large public spaces the electric light, though a disagreeable one, may be applied; but I believe there has not been a single instance of its being introduced as a mode of lighting houses, or, indeed, for lighting public lamps, in this country. We have yet to see whether such an experiment will be ventured upon; but, as far as my own judgment goes, if it is, it will thoroughly fail. The Directors have had a most able report made to them by a gentleman of very great scientific acquirements, and fully capable of forming a just judgment upon the whole question; he is a gentlemen who is very well known to almost every gas proprietor in the kingdom—I allude to Mr. Sugg. That gentleman went to Paris as an exhibitor of gas apparatus, and he employed a great deal of his time in investigating the process of electric illumination, and the conclusions that he has come to are embodied in a report which is too long to read to you, but from which I will read one or two extracts. In the commencement, he confesses that very great strides have been made in improving the light; but he says that the expense of the light is in darkness at present. I made the same remark when last Christmas I went to Paris myself to see the manufacture of the light from the beginning; for I totally failed to get an idea of the expense of the light as compared with the expense of gas lighting. As to the unsteadiness of the light, I pointed it out myself to the person who was most interested in it in Paris, and he was obliged to confess that there was a certain variation in its volume. Mr. Sugg says: "I have carefully noted the effects of the electric lighting on a large scale, as shown in Paris in the Avenue de l'Opéra, in which there are a great number of powerful lights in close proximity. Although undoubtedly the place is well lighted, yet it does not convey to my mind anything like the effect which ought to be produced from the enormous number of candles it is supposed to represent. It was noticeable that during the illuminations at the national *fête* a short time back the oil lights and the gas jets completely overpowered the electric light by the volume of light given. The electric light looked bluish white, and the oil and gas were yellowish, but the electric lights were considerably inferior in volume of light given." That is a positive fact, and it is one of the most extraordinary features of the electric light. The light is most intense, but there is no volume, therefore it is not dispersed. When you see an electric lamp lighted, you say immediately, "What a magnificent light!" But go under the lamp, and you will find you cannot read. I have tried it myself with these very lamps in front of the Grand Opera in Paris, and have found that to be the case. Mr. Sugg continues: "There is great intensity of light in a small space, but it appears to me that unless lenses or other apparatus can be used to convert the intensity of the electric light into volume of light it will always be inferior as a lighting agent to gas properly consumed in lights of from 100 to 300 candles. These gas lights give nearly the white pure light of daylight, with scarcely any actinism. The electric light, on the contrary, is overcharged with actinism, as compared with daylight, is blue in colour, and injurious to the eyes." That I can vouch for, for after I had seen the experiments in Paris I could scarcely see my way out of the place. I was so dazzled, and was made so uncomfortable, that it was some minutes before I regained my proper vision. He then says, "No effort on my part has enabled me to arrive at anything like a true idea of the relative position of the two modes of lighting. The cost of carbons (a very important item), attendance, motive power, &c., appears to be involved in the greatest obscurity." And so they are; they could not give me an answer on any one of these points. "All I have seen is unsatisfactory on this head, and the relative cost appears to be, as stated to me by an eminent Paris electrician (at present) a delicate question." That is a question that they cannot answer; it has never been solved; they make a speculative jump at it, but they cannot tell you what the comparison is between gas lighting and electric lighting. "Comparing such a light with gas, as it is usually burnt by the public, more especially in street lighting, no idea can be formed of their relative value. The difference is probably as great as that between the old Roman lamp and the moderator lamp of the present day." So that Mr. Sugg's opinion, as far as it goes, is very decided as a confirmation of what I have stated, that we need have no great fears as to our property being deteriorated by this mode of illumination. I will now allude to the next question. I regret that I am obliged to allude to it, but it has appeared in some of the papers that amalgamations are on foot between the Chartered Company and some other Companies in London. All I can say upon the question at the present moment is this—that we are in friendly negotiations with some other Companies for amalgamation, and I sincerely trust, being a thorough amalgamatist myself, that those negotiations may prove successful, and that before the next meeting, we shall have something definite to report upon it. We have this day passed a resolution requesting the members of the Boards to meet us here next Tuesday, to discuss the whole question, and I have very little doubt that, as the terms proposed have been partially accepted, the issue will be something definite, and something very satisfactory to this Company. Every amalgamation that we have entered into has tended in that direction, and I do not see why the extension of our system to the other side of the water, and, perhaps, by-and-by, on this side of the water, can be otherwise than beneficial to the Company at large. In carrying out this principle of amalgamation, the Board are only following out the principle which was confirmed by the Proprietors at a general meeting some years ago; and since that time we have joined with the Imperial Company. The report which was then agreed to stated—"The Directors further desire to point out that the principle of amalgamation, as enjoined by the Act of 1868, has been proceeded upon by them, so as to bring within the scope of that Act, so protective to the interests of the consumer, a large district formerly lighted by the Equitable and Western Gas Companies, over whose supply no sort of public control had previously been exercised. It has already resulted in economy of management, which, although as yet but in its infancy, will continue to grow year by year, and will be entirely for the benefit of the Company. The Directors have frequently expressed their opinion that advantages would accrue from further amalgamations; and now, with the experience of the past and the present to guide them, they assert that great additional benefits, attainable by no other process, would speedily be conferred upon the consumers of gas, in a further and very material reduction in price over the entire Metropolis, were the principle of amalgamation extended and carried out so as to embrace, in one management, the whole of the existing London Gas Companies." Gentlemen, in what we are about to undertake, if we see our way, we are merely pursuing the same policy that we have done for many years, with your entire sanction, and to your entire benefit. And you may depend upon it, that your Board of Directors will not enter into any arrangement with any Company unless they see their way to benefit the parent Company in every possible manner. Now, gentlemen, I am afraid I have detained you a long time, but I will wind up what I have to say to you by giving you a few statistical figures, which will bear out what I stated at the commencement as to the favourable character of our working during the past half year. We have during that period carbonized the extraordinary quantity of 540,364 tons of coal. In 1877 our make of gas per ton of coal was 10,048 feet; in the half year under consideration it has been 10,348, showing an increase of 300 feet per ton. That we have achieved, as I said at the outset, by the emulation and the successful exertions of our Engineers, to whom very great credit is due. That 300 feet really represents profit. We get more out of the coal than we used to do; we use less cannel coal than we did; and the result is that, by careful carbonization, we produce a much larger quantity of gas. The per centage of gas sold on the make has been 92·35; the gas used on the works has been 1·28 per cent.; and the gas lost 6·37 per cent., as against 5·79 per cent. The loss is in excess of last year; but I think that is fully accounted for by the enormous works going on in the City in the removal of whole streets and rows of houses, and the substitution of new ones, during which process some unavoidable escapes of gas take place that we cannot account for. The cost of coal per ton this half year has been 6s. 11d., against 6s. 9d. in the preceding half year. This is easily accounted for. It is the net cost, after deducting the proceeds of all residual products, such as tar and coke, and the diminution on these articles amounts to no less than £16,000 in the half year. If they had maintained their original prices, our coal would have been 8d. per ton cheaper than in the corresponding period of 1877. The bad debts are only 0·35 per cent., which is something quite extraordinary. Our collectors are so very vigilant and active that our bad debts, out of an enormous rental of nearly 1¼ millions, amount only to £3217—a mere bagatelle. The increase in the gas sold in 1878 over 1877 has been 4·32 per cent. The gross cost of the coal per ton has been 15s. 10d., against 16s. 6d. in the corresponding period of last year. I can only add that your Directors consider that the present position of the Company is most satisfactory. I think the shortness of the report intimates as much to you; and we have kept no secrets from you in any possible way. I have now to move—"That this meeting do agree with and confirm the report of the Directors, and the Auditors statement of the accounts of the Company."

Captain GIFFORD seconded the motion.

Mr. JACKSON said that the report was so eminently satisfactory, that little need be said with reference to it. The Governor had enlightened the Shareholders with regard to the affairs of the Company, and they might gather from the very clear accounts placed before them, that they were doing as well during the present half year as in the previous one, and there was no doubt that that would be appreciated by the Shareholders. He desired to say a few words with reference to some of the remarks of the Governor. Allusion had been made to the scientific experiments which, as Englishmen, they must all desire to see succeed. "More light" was what every civilized country desired, and there could be no doubt that the electric light would be established. For himself, he should welcome it heartily, and he had no fear of the result in regard to the financial position of the Company. The public lighting of the streets by the Company only amounted to about £63,000, which was not three-quarters per cent. of the total revenue of the Company—namely, £925,000. Supposing that all the public lights in the great thoroughfares were on the electric system, the result could not possibly be more than a diminution of three-quarters per cent. upon the receipts; but in Paris the system had only been attempted in very great thoroughfares, and in open spaces like that before the Royal Exchange. The Metropolitan Board of Works intended to use the electric light on the Embankment, and it was very desirable that they should do so. He had been told, however, by a Frenchman, that the electric light positively penetrated the blind of his bed-room, so that he could not sleep for the glare of it. He thought that they might look calmly upon the progress of science without any fear or anxiety as to the financial position of the Chartered Company. He was about to go to Paris in a few days, and hoped to be able to verify the facts that had been stated. He thought that an exaggerated view had been taken of the matter, and he was sure that it might be dismissed from their minds.

Mr. WIGGINS said he should only be giving expression to the feelings of every Shareholder in the Company when he stated that they thanked the Governor for the very able and clear explanation he had given of the present position and the future prospects of the Company. He was quite sure that they all felt greatly indebted to the Directors for the wise course they had adopted in making coal contracts for two years, now that coal was lower than it had been in the memory of the present generation. They all desired to carry on the business with as much economy as possible, and there was one suggestion which he wished to make with reference to a plan that had been adopted in Birmingham, where the two Gas Companies had recently been sold to the Corporation. He referred to the mode of collecting the accounts. He observed that the Chartered Company were paid £11,000 to £12,000 last half year for commission. Under the old *régime* in Birmingham a large sum was paid to the collectors, but when the supply came into the hands of the Corporation they did away with commissions, and allowed a certain discount to all persons bringing their money on or before a certain day; the result was that, in order to get these allowances, people rushed to the office at the time appointed, and the accounts were exceedingly well paid—better than they were under the old *régime*, and the cost of collection had been considerably reduced. If such a system could be introduced in London, he had no doubt that it would effect a considerable saving in the working of the Company. With regard to the electric light, that was a subject to which he had paid great attention, having been largely connected with Gas Companies for many years. He had seen the light in Paris in the Rue de l'Opéra, and, although he did not quite agree with the view taken of it by Mr. Sugg, yet, as a Gas Shareholder, he had no fear of its coming into serious competition with

gas property. He thought the light a very brilliant one. The bedroom he occupied in his hotel was opposite one of the lights, but he certainly slept very well, and his slumbers had not been affected by the brightness of the light. Like Mr. Sugg, he had found the greatest difficulty in obtaining any account as to the cost of the light. Information was given as to how the light could be applied, but no correct idea was given as to the cost. With regard to its competition with gas, it should be remembered that there were no residuals in connection with it, while the residuals of gas manufacture formed a large source of profit, and were becoming more and more valuable every year. Since the old Peruvian guano failed, very little ammonia came into this country, and the greatest supply was from the ammoniacal liquor of Gas Companies, and as the use of sulphate of ammonia increased, the prices of residuals would increase. While he would be delighted to see electric lighting carried out as a scientific improvement, he had no fear of its permanently injuring gas property. Gas had been largely introduced in cooking arrangements; there were also many manufacturing processes that required gas to a very large extent, and the convenience of its use was so great that he had no fear of serious competition. He regretted that something had not been said about a final call on the 5 per cent. preference shares, fifth issue. He believed that on a previous occasion some intimation had been given that the final call would be made during the present year. The Shareholders would be delighted to pay the call on the 1st of October, and if the final call could be made in January next, they would be still more delighted.

Dr. WYLD said that at the last meeting he had made a few observations on the interesting question of electric lighting, and he now desired to make a few remarks on the same subject. As a scientific man, he had no doubt that electricity, being a power—or a fluid, as some called it—universal in nature, would be so applied as to produce a light that might seriously compete with gas some day; but he was not alarmed on that score, when he remembered the application of gas to heating and cooking. He desired to know whether the Directors were considering the possible risk that they were running, and whether they were endeavouring to provide against it by encouraging the use of gas in every way, for heating and cooking. He had understood from one of the Directors that offices had been erected in some part of London, where various experiments were made with reference to the use of gas, and he would urge upon the Directors that heating and cooking experiments should be included in them. He had, himself, a cooking apparatus in his own house, and had found it very useful and not expensive. If the cook were properly rewarded for careful use of the gas, he believed that it would be found cheaper than coal, and he was also of opinion that the use of gas for heating power in private houses might be made seriously to compete with the use of coal in open fireplaces. He hoped that some assurance would be given that the Directors had turned their attention to this subject.

Mr. DOANE hoped the Board would in future show in the accounts the sum charged for the works for the ultization of products at Beckton, because the experiment was a very interesting one, and it was desirable to know whether it was a commercial success.

The GOVERNOR said that the Directors had no power to make any alteration in the form of accounts, but the suggestion should be submitted to Mr. Parkes, the Official Auditor. The directors could have no objection to the proposal, but at all events he (the Governor) would be able to tell the Shareholders to a shilling what the cost of the works was when they were completed.

Mr. SHOOLBRED, C.E., wished to make some observations on the electric light, in which he had taken considerable interest, though he was in no way connected with it. There was no doubt great difficulty in obtaining reliable figures with reference to some of the recently introduced systems in Paris, where there they were in the hands of patentees; but private manufacturers in and around Paris, Rouen, and other places, who had taken the matter into their own hands, would not hesitate to give the figures, and they stated that they were well satisfied not only with the quality of the light, but with the price at which they obtained it—considerably less than the previous cost of gas. Of course they were placed in peculiar circumstances. Being manufacturers, they had engine power at command, which cost them very little, but which to most persons would be an expensive item. With regard to the supply of private houses, he did not think that gas companies were in danger of any diminution of their business; for the result of his own observations, and of the observations of others to whom he had spoken, was that the use of electricity for private lighting was almost an impossibility unless, indeed, very great changes were made in the mode of its application. It might be used for lighting large open spaces, but attention had already been called to the small proportion of public lighting to the whole consumption of the Chartered Company. As to the experiment in the Rue de l'Opéra, in Paris, he did not think it would be renewed. It wanted certain elements of success, and it was moreover costly. The experiments the Company were carrying out should be directed to the divisibility of the light—the production of a variety of lights from a single electric source—and not so much to the giving out of one light alone, which always led to an unpleasant result, owing to the intensity of the current and the fluctuations produced, just as in the case of a gas-burner turned full on without the power of regulation. Improvements had been made upon the Jablochkoff system so as to tone down the lights, and make them almost as small as gas jets. The field of electric lighting was a peculiar one, which, in his opinion, did not clash with the supply of light by gas companies.

Mr. BADDELEY said he was largely interested in foreign gas companies, and he did not for a moment fear the competition of the electric light. Where the light had been introduced in foreign towns, he believed it had been discontinued, so little confidence being felt in its use for business purposes. In comparing the cost of the light in France with that of gas, it should be remembered that the price of gas was considerably higher there than in London. In Paris the cost was 6s. 9d., and in London 3s. 6d. per 1000 cubic feet. If the electric light were used as a source of illumination in England, he thought it would be rather an assistance to gas companies than otherwise. It could not be obtained without a vast amount of motive power, and he believed it was admitted by the patentees themselves that they would probably have to use gas for the purpose of generating the steam in the engines by which the light was to be obtained; so that instead of superseding the use of gas, it would rather encourage it. With regard to public lighting, that was a thing that both English and foreign companies would be glad to get rid of. It was always a source of annoyance, bringing the companies in contact with the local authorities with regard to the quantity of gas actually supplied. If the companies only supplied private customers, they would do a more profitable business, and would be relieved from a great source of annoyance. It was notorious that public lamps were supplied at a loss, in order to obtain concessions fixing a higher price upon the private consumers. He believed, moreover, that leakage would be considerably reduced if there were no public lights to be supplied. With regard to amalgamations, he was glad that the Board had not hesitated to bring the subject before the remaining Companies in London, because, from the accounts that had been presented, it was evident that a great economy had been effected, not only in the management, but in the price of gas to the consumers. He saw by the almanac that that day was the anniversary of the introduction of gas into London. The Chartered Company was then the only one that supplied the Metropolis. It had branched out into other companies; but as history repeated itself, he had no doubt they would live to see the day when it would be again the only Gas Company in London. He congratulated the Directors on having made coal contracts for two years. He only regretted that they could not make a contract with the clerk of the weather for a winter season that would facilitate the sale of the coke. But as there had been three mild winters, looking at the average, there was a chance of a good old-fashioned winter in the next year or two, such as would justify the Directors in recommending an increased dividend to the Shareholders who would be only too happy to receive it.

Mr. VALPY asked Mr. Shoolbred what was the smallest electric light that could be produced by one burner. The smallest he had himself heard of was 150 candles, but practically there was nothing under 500.

Mr. SHOOLBRED said he was not acquainted with any light producing less than 700 or 800 standard sperm candles.

A SHAREHOLDER suggested that the dividend should in future be paid free of income-tax.

The GOVERNOR said that that would be *ultra vires*. It was provided by the Official Auditor that the income-tax should be paid by the Proprietors, and that could not be departed from. With regard to the suggestion as to increasing the sale of coke and gas for cooking, he might mention that the Company had subscribed to the agricultural meeting for next year, to be held in London, where a very large collection of gas-cooking apparatus would be exhibited; and the same kind of things would be shown by the Company.

The motion for the adoption of the report was then put and carried.

The SECRETARY brought up from the Court of Directors a minute recommending the dividends mentioned in the report, and on the motion of the GOVERNOR the dividends were declared accordingly.

The GOVERNOR: That, gentlemen, is the business of the day. With regard to the remarks that fell from an honourable proprietor as to the mode of collection, I do not think that we could apply the system he advocated. Ours is much too large a concern to admit of people coming here to pay their accounts. We should have to keep a host of clerks to receive the money. Besides, the collections under the present system are so extremely satisfactory, that it would be a great pity to disturb them.

Mr. ROKEBY PRICE moved a vote of thanks to the Governor and the Board of Directors for their services during the past half year.

The motion, having been seconded, was adopted by acclamation.

The GOVERNOR briefly acknowledged the vote of thanks, and the proceedings terminated.

NOTTINGHAM CORPORATION GAS SUPPLY.

A Quarterly Meeting of the Nottingham Town Council was held on Monday, the 12th inst.—the MAYOR (Sir James Oldknow) in the chair—when the following report was presented:—

To the Town Council.

The Gas Committee report that they have conducted the business of the gas undertaking of the Corporation, entrusted to them by the Council, for the year ending June 30, 1878. They present herewith an abstract of their receipts and expenditure up to that time. It will be seen that there is a balance on the profit and loss account of £12,524 15s. 7d. in favour of the Committee. This balance remains at the disposal of the Council, for the purposes mentioned in the 7th sub-section of the 36th section of the Nottingham Corporation Gas Act, 1874.

Your Committee recommend that, after payment of £5000, by order of the Council, made on the 25th day of May last, the balance should be carried to the credit of the reserve and sinking-fund.

Your Committee are glad to be able further to reduce the price of gas 2d. per 1000 feet, being the third reduction since the undertaking has been in the hands of the Corporation. This reduction will make the price of gas as low as it has ever been in Nottingham.

J. L. THACKERAY, Chairman.

Dated the 25th day of July, 1878.

Alderman THACKERAY, in moving the adoption of the report, said he considered this a matter which, in connection with the Corporation, was of very great importance. It was a case of good management, and the result financially was most favourable upon the present occasion. There were several figures to which he should like to call attention, and, therefore, it would be necessary for him, to a certain extent, to review the report. This was the fourth year that the gas-works had been in the hands of the Corporation, during which time the profit realized had been £32,091, and this, with a reduction in the price of gas to the consumers of over £10,000 per annum. It must be also borne in mind that the Corporation had had to meet the extra interest upon annuities, amounting to £17,660, besides differential rates in the outlying districts, £6000; and if the Corporation were in the position of the late Company, and those two sums were added to the profits, they would amount to £65,751. It was now proposed to further reduce the price of gas of 2d. per 1000 feet, which would be equivalent to another £5000 per annum in favour of the consumers, and thus upwards of £15,000 per annum would be the reduction since the gas-works had come into their hands. This reduction brought the price of gas down to the lowest point touched by the late Company, and this could not but be satisfactory, as the works were in a much more efficient condition than they were when handed over to the Corporation in 1873-4. The Committee did not wish to say this in disparagement of the late Company's management, as, in all matters of this kind, improvements and extensions moved on together. The works at Radford had had, to a certain extent, to be reconstructed; new gasholders had been erected, the retorts changed from iron to clay, with additional retorts to each oven, a new chimney, engine-houses for the exhausters, new boiler-houses and boilers, increase of purifiers, iron coal-sheds, tanks, &c., had been added, by means of which the productive power of the works was now doubled. Then a new large gasholder at Nottingham and one at Basford had been erected. A new main had been laid to Eastwood, to give a better supply of gas to that district. A large liquor-tank at Basford, and a main to convey the tar and liquor to the wharf at Radford, were also amongst the new works. At the present time the Committee were erecting new chemical works at Giltbrook, and he could also add that the illuminating power and quality of the gas were never better. The Committee might have been able to show greater profit but for the construction of these works, but they had been determined to keep the works up to their most efficient condition, and he believed they would bear comparison with any similar gas-works in the country. Mr. Wilson had given him some figures, which he had pleasure in laying before them. The increase in gas sold was as follows:—In 1873-4 the amount was 572,000,000, and he should show them that the increase was regular, that there was little deviation, notwithstanding the depressed state of trade in the town; and, as they knew very well, during the past three or four years, trade had not been very flush. Notwithstanding this their gas undertaking had not suffered in consequence of the bad state of trade, but continued to be profitable. In 1874-5 the amount of gas sold was 613,000,000; 1875-6, 659,000,000; 1876-7, 662,000,000; 1877-8, 723,000,000, the latter being an approximate estimate. When the works were first purchased, the Council were alarmed at the price given for them, although at that time there was an inducement for the Company to dispose of the works, because of the price of coal, and no doubt in 1873-4 a considerable amount of money was lost. The money realized by tar and liquor was in 1873-4, £7601; and in 1877-8,

Statement of Accounts, Year ending June 30, 1878.

No. 1.—ANNUITY CAPITAL.

Description of Capital.	Maximum Yearly Annuity.	Number of Annuities Issued.	Nominal Amount of Annuity.	Total Amount Received.	Remaining to be Issued.	Total Amount Authorized.
	£ s. d.		£ s. d.	£ s. d.	£ s. d.	£ s. d.
Annuities	3 5 0*	7242	50 0 0	369,434 5 0	430,565 15 0	800,000 0 0

* Up to May 8, 1881, these annuities are of the value of £3 2s. 6d. each.

No. 2.—LOAN AND DEBENTURE CAPITAL.

Description.	Rate per Cent.	Total Amount Borrowed.	Remaining to be Borrowed.	Total Amounts Authorized.
Bonds, mortgages, and loans	£4 0 0	£87,771 0 0	—	—
Debenture stock	4 0 0	55,250 0 0	—	—
Premiums on ditto	—	1,509 8 4	—	—

Total annuity capital raised	£369,434 5 0	
Total loan capital raised	87,771 0 0	
Total debenture capital raised	56,759 8 4	
		£513,964 13 4

No. 3.—CAPITAL ACCOUNT.

Dr. *Cr.*

—	Expenditure to June 30, 1877.	Expended this Year.	Total to June 30, 1878.
Expenditure to June 30, 1877	£474,360 3 9	—	
Since that date—			
Lands acquired	..	£3,009 7 6	
New buildings, manufacturing plant, storage works, and other structures connected with manufacture	..	19,563 11 2	
New mains, laying, paving, &c.	..	5,876 1 4	
New meters	..	2,239 13 6	
Cost of promoting special Act	..	1,373 13 0	
	£474,360 3 9	£32,062 6 6	
Total expenditure	..	..	£506,422 10 3
Less received from Midland Railway Company for land and compensation	..	..	2,800 0 0
			£503,622 10 3
Balance capital	..	..	10,342 3 1
			£513,964 13 4

—	Certified Receipts to June 30, 1877.	Received during the Year.	Total Receipts to June 30, 1878.
7242 annuities, of the nominal value of £50 (actually raised by the late Company)	£369,434 5 0	—	
Bonds and mortgages	78,044 9 10	30,000 0 0	
Debenture stock	40,404 5 0	16,355 3 4	
	£487,882 19 10	£46,355 3 4	
Less loans repaid	..	20,273 9 10	
	£487,882 19 10	£26,081 13 6	£513,964 13 4
			£513,964 13 4

No. 4.—REVENUE ACCOUNT.

To Manufacture of gas—		
Coals, including carriage, unloading, and expenses of depositing on works	£47,033 17 3	
Purifying materials, oil, water, and sundries at works	2,585 0 10	
Salaries of Engineers, Superintendents, and Clerks at works	2,270 17 10	
Wages and gratuities at works	19,849 2 3	
Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials, and labour	16,472 10 0	
	£88,211 8 2	
Less old materials sold	207 13 0	
		£88,003 15 2
Distribution of gas—		
Salaries of Inspectors, Clerks in Light Office, and wages	£5,350 7 0	
Repair, maintenance, and renewal of mains, including wages, service-pipes, &c.	1,263 11 2	
Repairing and renewing meters	1,205 15 8	
		7,819 13 10
Public lamps—		
Lighting and repairing	..	229 4 5
Rents, rates, and taxes—		
Rents and acknowledgments	£166 3 0	
Rates and taxes	3,407 14 0	
		3,573 17 0
Management—		
Salaries of Clerk to Committee, General Manager, and Clerks	1,812 5 0	
Collectors	1,066 17 11	
Stationery and printing	682 5 11	
General establishment charges and incidentals	542 14 2	
Auditors	65 15 0	
		£4,169 18 0
Law and parliamentary charges—		
Law		255 3 0
Parliamentary (oppositions)		—
Bad debts		550 12 7
Sundries		—
Balance		40,315 0 9
		£144,917 4 9

By Sale of gas—		
Private consumption {3s. 2d., 3s. 1d., and 3s. 3s., 2s. 11d., and 2s. 10d.}	£103,115 3 4	
Public lights	5,542 11 3	
Rental of meters	4,729 16 10	
		£113,387 11 5
Residual products—		
Coke and breeze, less labour and carriage	£13,661 17 8	
Tar	10,921 10 11	
Ammoniacal liquor	3,249 12 8	
Refuse lime and other purifying material	386 14 7	
		£28,219 15 10
Sundries—		
Meters, service-pipes, brasswork, and materials of distribution	2,138 15 5	
Fines and penalties	—	
Amount from reserve-fund	—	
Receipts for lighting, cleaning, and repairing lamps	145 3 2	
Incidental receipts (including £335 6s. 9d., interest received from Midland Railway Company on purchase-money)	1,025 18 11	
		£144,917 4 9

No. 5.—PROFIT AND LOSS ACCOUNT (Net Revenue).

Interest on loans	£3,268 3 2	Balance brought from revenue account, No. 4, being profit for the year ending June 30, 1878	£40,315 0 9
Ditto on debenture stock	2,173 4 6		
Annuities	22,348 17 6		
Balance	12,524 15 7		
	£40,315 0 9		£40,315 0 9

No. 6.—RESERVE AND SINKING FUND ACCOUNT.

Amount of balance carried to next account	£34,368 14 8	Balance brought from last account	£27,363 18 4
		Balance of profits, June 30, 1877	5,781 12 11
		Interest on amount invested	1,223 3 5
	£34,368 14 8		£34,368 14 8

No. 7.—STATEMENT OF COALS.

Description of Coals.	In Store, June 30, 1877.	Received during Year.	Carbonized or Used during Year.	In Store, June 30, 1878.
	Tons.	Tons.	Tons.	Tons.
Common	9062	81,913	85,440	5535
Cannel	77	2,827	2,577	327

No. 8.—STATEMENT OF RESIDUAL PRODUCTS.

Description of Residual.	In Store, June 30, 1877 (estimated).	Made during Year (estimated).	Used in Manufacture during Year (estimated).	Sold during Year.	In Store, June 30, 1878 (estimated).
Coke and breeze . Tons.	343	55,519	20,471	33,189	2,202
Tar . . . . Galls.	64,877	1,044,240	1,362	1,015,277	92,578
Ammoniacal liquor ,,	171,599	1,698,083	—	1,716,368	153,314

GENERAL BALANCE-SHEET.

To Capital account—		**By Amount invested, reserve and sinking fund**	£34,368 14 8
Balance at credit thereof, No. 3	£10,342 3 1	Cash at bankers	8,965 10 10
Profit and loss account—		**Stock on hand, June 30, 1878—**	
Balance at credit thereof, No. 5	12,524 15 7	Coals	2,767 4 0
Reserve and sinking fund account—		Coke and breeze	660 4 6
Balance at credit thereof, No. 6	34,368 14 8	Tar and liquor	1,256 15 11
Sundry tradesmen and others, for amount due for coals, stores, &c., to June 30, 1878	756 16 3	Sundry stores	5,984 19 6
		Arrears outstanding	319 6 6
		Coke and other residuals	3,326 17 3
		Sundry accounts	342 16 5
	£57,992 9 7		£57,992 9 7

£14,170. The capital account showed a sum of £513,964, and the average increase during the last four years had been £26,632, or 6½ per cent. per annum. The net profits, after paying annuities and interest, were, in 1874-5, £5153, and he might just as well tell them how this was proportioned, £4369 being paid for cost of transfer, and £784 to the reserve and sinking fund. In 1875-6 the amount of profit was £8733, £3237 being appropriated to rectify capital, &c., £5000 to the Museum and University buildings, and £396 to the reserve and sinking-fund. In 1876-7 the profit was £5781, which was placed to the credit of the reserve and sinking-fund. In 1877-8 it reached £12,524, of which £5000 was devoted to the cost of the Royal visit, and £7524 to the reserve and sinking-fund. With regard to the apportionment of the profit, he should strongly advise the Council that until the reserve and sinking-fund was brought up to a sum which would fairly represent the large capital they had at stake, they should not cease to add to it until it reached something like £100,000, the interest on which sum alone would always keep the fund increasing. He might tell them that coal now was cheap and good, and, at the present time, they were getting more gas from the same amount of coal than they did when coal was dear and not so good in quality. He would, before concluding, read the few remarks sent to him by Mr. Wilson, and which would show their position: "The profits made are due to several causes, among which are the extra quantity of gas made, for the increase reduces the cost of the gas;" and there was no doubt the larger the works the more gas was made, and there was increased value. Then "the tar and liquor are a reproductive power; the utilization of hitherto unproductive plant which was bearing interest; the saving in wages, and other matters; the low price of coal. Our manufacturing power is now getting exhausted, the ordinary increase of duplication every ten years is being maintained, and at this ratio we have only sufficient retort, &c., power to carry us over the winter of 1879, so that there must necessarily be a further and considerable outlay very soon. Possibly small works, as contemplated at Eastwood, would carry us over another two years—say to 1881—but we must by then be prepared (and these works will take two years to erect) with large additional works at Basford. In this view I have not calculated for any sudden revival in the Nottingham trade, which may take place as it has done before. In such a case we should have to expedite our extensions." He (Alderman Thackeray) might say the Committee were perfectly alive to this, and, as the Council were aware, had purchased land at Eastwood for the purpose hereafter of establishing works there; but, in the meantime, they were strongly of opinion they should make use of their ground, as far as extending both Radford and Basford works was concerned. Let the Council look at Radford and see what they had been doing there—putting down new engines, by which means those works would be doubled or trebled. There was another reason why it was advisable first to extend their present works, which was this, that if they put on the works at Eastwood they would require a new manager and an entirely new staff. Therefore he thought the works to be carried out at Eastwood should be delayed as long as possible. So, as Chairman of the Committee, he did not think any committee could be more assiduous than they were in the management of the works. The Council must be aware of this, that four years ago they came into the concern inexperienced, whereas now several of the Committee had become well versed in the matter, and were quite capable of forming their own opinions and directing the works, and had every confidence in their officers. He thought the Corporation were exceedingly well served—Mr. Wilson was a most painstaking manager, and the various managers at the different stations were all vieing one with the other to make their results as profitable as possible. He moved that the annual report of the Gas Committee be received and adopted, that the balance of the profit and loss account be credited to the gas sinking-fund, and that the price of gas be reduced 2d. per 1000 feet.

Alderman BARBER seconded the motion, which was carried.

GRANTHAM GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Tuesday, the 6th inst.—Mr. J. F. BURBIDGE in the chair.

The following report was presented:—

At the half-yearly meeting, held in February last, your Directors reported the satisfactory state of the affairs of the Company, which they hoped would prove favourable for the general meeting to be held this month—August. They are able to say those anticipations have proved to be correct, as the statement of accounts now laid before the Proprietors will testify.

On the 4th of March last your Directors were authorized, at an extraordinary general meeting of the Shareholders, to increase the capital of the Company from £25,000 to £30,000, by the creation of 250 new shares of £20 each, which are to be paid up at the close of the present year.

In the same report a reduction in the price of gas from 4s. 7d. to 4s. 2d. per 1000 feet was authorized, and has been fully carried out. Your Directors have the further pleasure of announcing that, from the satisfactory state of the accounts, they are enabled to recommend a further reduction from 4s. 2d. to 3s. 9d. per 1000 feet, being the third reduction in little more than two years; and, notwithstanding this great advantage given to consumers, your Directors are enabled to recommend the full dividend of 10 per cent.

From the Revenue Account for the half year it appears that the receipts amounted to £7694 2s. 3d., which includes the following items:—Balance brought forward from statement of accounts to Dec. 31, 1877 (less outstanding accounts), £3732 16s. 2d.; amount of gas-rental, £3186 2s. The principal payments were coals and carriage, £1545 5s. 5d.; maintenance of works, £162 18s. 7d.; salaries and wages, £566 11s. 5d.; meters and inspection, £138 12s. 1d.; directors, for management, £100; amount to reserve-fund, £750; amount carried to reserve-fund, repaid from the capital account, £500. The account shows a balance in favour of the Company of £3598 12s. 10d.

The CHAIRMAN, in moving the adoption of the report and accounts, said that he had only a few observations to make, and these would principally relate to the accounts, which, as the Shareholders would see, were of a very flourishing character. They left off with a good balance in their favour, and the Shareholders would find that the Directors proposed to pay the usual dividend of 10 per cent., and reduce the price of gas. Those were two very good things, he thought; for while one would actually put money into their pockets, the other meant the taking away of a little less. There was also another matter to which he had to refer, and which was not mentioned in the report. The Company had sufficient money in hand to allow the payment of 2½ per cent. on the short-paid dividends. A few years ago, the dividends fell to 7 and 7½ per cent., and the Directors now proposed to pay 2½ per cent. for those back dividends; so that it was something like saying the Shareholders would get 12½ per cent. this year. He hoped that this would be satisfactory—at any rate, it could hardly fail to be so to those who held a good many shares. He also directed attention to the manner in which they were laying out the money received from the increased number of shares. They were paying off the debenture bonds, and they were also paying to the reserve-fund £2500—of which £2000 was invested in 3 per cent. Consols, and the balance was at the banker's. Apart from this, he should mention that they had a reserve with which to pay off the debenture bonds, specially deposited, which would become due in October; so that the money was all ready, and they were receiving interest upon it, and when the time came they would pay those bonds off.

Alderman BOYALL seconded the motion, which was unanimously agreed to.

The CHAIRMAN moved, Mr. B. C. OGDEN seconded, and it was agreed, that a dividend of 10 per cent. be paid, with a further sum of 2½ per cent. for back dividends.

Mr. J. G. THOMPSON, in moving a vote of thanks to the Chairman, said the Shareholders had to thank him for presiding over them during one of the most successful years he thought the Company had ever seen. He had presided over them during times of difficulty, and brought the Company into a most prosperous condition, and their hearty thanks were due to him for the great energy he had shown in conducting their affairs, and for his attention to the business of the Company. The accounts which had been presented were highly satisfactory, for not only were they able to pay a dividend of 10 per cent., and 2½ per cent. for back dividends, but they were also able to establish, for the first time, a reserve-fund, which already amounted to £2500. He regarded this as very satisfactory, inasmuch as they would have this fund to fall back upon in bad times, and thus be able to maintain their dividends.

Mr. OGDEN seconded the vote of thanks, and cordially endorsed Mr. Thompson's observations.

The CHAIRMAN said he could only repeat what he had said before on these occasions—that the Directors, as well as himself, endeavoured to do the best they could for the Company, and he trusted they had succeeded in doing what was right and just, and "paying" as well.

MANCHESTER CORPORATION WATER SUPPLY.

THE THIRLMERE SCHEME.

A Special Meeting of the Manchester City Council was held last Wednesday—the MAYOR (Alderman Grundy) presiding.

The following report from the TOWN CLERK (Sir Joseph Heron), in reference to the failure of the Corporation Water Bill in the last session of Parliament, was presented:—

The Manchester Corporation Water Bill was introduced and promoted for the purpose of obtaining, from Thirlmere, water required by Manchester and the district within the limits of supply of the Corporation; and the idea of "trading" with any portion of the water so obtained, by its supply to other and outlying districts, was not entertained.

In its passage, however, through the Commons, the Bill assumed, by the alterations or additions made by the Special Committee, acting under the instructions given to them by the House of Commons, a very different, and, indeed, a much more important character, and it became a scheme for the supply of water not only to Manchester and its own special district—the requirements of which were fully admitted—but also to other large and important towns and districts in the neighbourhood of the proposed works.

By the alterations made, amongst other places the important towns of Oldham, Wigan, St. Helen's, Kendal, Warrington, Hindley, and other districts, now containing a population of nearly half a million, and proved to be greatly in want of water, became, with the inhabitants of the city and the district now supplied by the Corporation, much interested in the success and carrying out of the Thirlmere scheme.

The Bill, in its altered character, to a large extent, carries out the recommendations made by the Royal Commission presided over by the Duke of Richmond. The report of such Commission states:

"We would strongly call attention to the remarkable tendency that towns in the manufacturing districts have to arrange themselves in groups. Take, for example, the enormous group around Manchester, the group of the Potteries, the group of towns immediately to the north of Birmingham, the groups on the Tyne and near the mouth of the Wear, and many other instances.

"This tendency ought always to be considered as an essential element of any arrangements for water supply. Such a group of towns uniting together may go for a much better and more perfect scheme than any one of them separately; and the Legislature ought not only to encourage, but as far as possible to compel, such a combination.

"Referring again to the Cumberland Lake District, it is obvious that it might be made, by a united effort, available for providing an almost unlimited supply for great groups of manufacturing towns in the North of England, but it is only by a large union of districts that the expense of such a scheme could be justified.

"We, therefore, consider that, when any town belonging to a large group, particularly if forming the nucleus of it, comes to Parliament for a Water Bill, the scheme should be so designed as to include the whole group."

It may be also said that the Bill, as amended, is in agreement with, and the first attempt to carry out the suggestions contained in the letter recently addressed by His Royal Highness the Prince of Wales, upon the subject of water supply, to the Society of Arts.

The importance of the changes made was fully understood by the Thirlmere Defence Association, and other parties, who opposed the Bill before the Lords Standing Orders Committee; and such changes were, in fact, the main objection urged against the suspension of the Standing Orders. It was contended by such opponents—and no doubt with truth—that as the Bill was introduced they were only called upon to show that the wants of Manchester and its special district were not of such a character as to justify the proposed interference with Thirlmere; but that with the clauses added by the Committee of the Commons, and without the notices required by the Standing Orders, it would be absolutely necessary, in order to ensure success, for them to prove not only that the wants of Manchester and its district, but also of the large additional population proposed to be benefited, were not, when taken together, of such a character as to justify the approval of the Bill of the Corporation. Supposing that it might have been possible to obtain from the House of Lords the suspension which was refused by their lordships Standing Orders Committee, the same objection would doubtless have been strongly pressed in Committee by the opponents of the Bill.

Under all the circumstances it was deemed to be the more prudent course to submit to the decision of the Lords Committee, and to introduce the Bill as sanctioned by the unanimous decision of the Committee, presided over by the Right Hon. Lyon Playfair, as well as by the House of Commons, during the next session, when the result of any opposition which may be offered by the Thirlmere Defence Association and their Associates may, in the opinion of the Town Clerk, with absolute confidence be anticipated.

The time and the money of the ratepayers expended, and which is to a considerable extent thrown away, is much to be regretted; but it can hardly be doubted that a Bill of so important a public character, and which is really the commencement of a new era in water-works legislation, will receive the willing sanction of both branches of the Legislature.

The following report from the Water Committee was also presented:—

Your Committee much regret that as the consequence of the decision of the Lords Standing Orders Committee, a large amount (probably not less than £25,000) has been to a certain extent thrown away, but they entirely concurred in the recommendation of the Town Clerk that no steps should be taken to reverse such decision. It is, however, some consolation to know that the expenses of the renewed application will, as the consequence, be largely diminished.

Your Committee have assumed that application for the Bill will be renewed during the coming session, and feel that under the circumstances they might have contented themselves with merely asking for the necessary authority from the Council.

Doubts have been suggested whether, under the peculiar circumstances of the case, another meeting of ratepayers and owners, under the provisions of the Borough Funds Act, is really required; but, being unwilling to deprive the ratepayers of any opportunity to which any persons might consider they were entitled of again expressing their opinion upon the Thirlmere Bill, your Committee have, after consultation with the Town Clerk, unanimously determined to call another meeting, and again to apply to their constituents for their sanction to the renewed application to Parliament.

Your Committee feel assured that the result of such meeting will be greatly to discourage all opponents of the Bill, and materially to strengthen the hands of the Corporation.

Your Committee have nothing to add, as to the nature of the Thirlmere scheme, to the information already possessed by the Council.

The merits of that scheme have at all times been fully recognised and appreciated both by the Council and by the public of this district, and it is satisfactory to your Committee to be able also to state that they have been thoroughly established by and as the result of the severest ordeal to which any measure of this kind could possibly be subjected.

The information which your Committee have recently acquired satisfies them that a considerable annual income will arise from the sale and supply of water to other districts.

The progressive and constant increase in the revenue of the water-works department confirms your Committee in the opinion expressed, that in ten years or thereabouts—when, as suggested by the Select Committee, it may be reasonably anticipated that the existing supply for Manchester will be exhausted—the revenue will have increased to

such an extent as to render it unnecessary either to increase the water-rate now payable, or to make any claim upon the ratepayers for the purpose of paying the interest upon the capital expended, which it will then devolve upon the Corporation to provide.

During the past nine years your Committee have been enabled to pay out of revenue the sum of £148,069, expended in the execution of repairs and works in the Longdendale district which are not likely hereafter to arise or be required.

Your Committee direct special attention to the table submitted, which will doubtless be gratifying to the Council, as showing the satisfactory and constant increase in the revenue, and will also fully justify what, in the absence of such evidence, might appear to be the too sanguine expectations entertained.

To the information given in the table it may be added that in 1851, being the first year in which water was supplied from Longdendale, the revenue received was only £39,317, whilst in the year 1868 it had by constant progression during the intervening years increased to £121,483.

Statement of Revenue Account.

Year.	Gross Revenue.	Expenditure.				Annual Surplus applied to Works.
		Working Expenses, Management, &c.	Interest on Borrowed Money.	Sinking-Fund Account.	Total Expenditure.	
	£	£	£	£	£	£
1869	129,936	30,284	78,642	13,143	129,069	7,867
1870	136,660	29,853	81,233	13,715	124,801	11,859
1871	141,746	30,768	80,809	14,173	125,750	15,996
1872	149,751	32,884	80,962	14,563	128,409	21,342
1873	154,657	39,924	79,929	20,407	140,260	14,397
1874	162,888	40,652	85,816	20,736	147,204	15,684
1875	172,964	41,604	91,955	22,345	155,904	17,060
1876	179,574	41,334	96,199	35,635	173,168	6,406
1877	188,679	37,627	97,777	36,897	172,301	16,378

It will be observed that, in the year 1876, the surplus considerably diminished, as, in that year, the sinking-fund was, under the provisions of the Water-Works Acts, increased from 1 to 1½ per cent.

The surplus during the nine years, as set forth in the table, amounts to the sum of £126,989; and, if to that amount the deficiency which appears in the annual statement for the last year, of £21,080, be added, it gives the sum of £148,069, which, as before stated, has been, during that period, expended in works.

The requirements of the city and the district of supply are largely on the increase, and it seems probable, from recent experience, that the daily consumption of water will increase even more rapidly than was anticipated and suggested to the Select Committee. The daily consumption has, during the present summer, and as the consequence of the dry weather, occasionally exceeded 22 million gallons per day, and, but for the relief anticipated from the Thirlmere scheme, your Committee would have to take into their serious consideration the necessity for discontinuing the further extension of service-mains beyond the limits of the city, which necessity your Committee would much deplore, as the consequence would certainly be to put a stop to all building operations in the neighbourhood of Manchester.

In conclusion your Committee may remind the Council that, as stated by the Town Clerk in his report, the Bill has assumed an entirely different character. It is no longer a Bill to supply water to Manchester and its own district, but also to supply much-needed water to large and populous district situated "in the neighbourhood" of the intended works. It is a Bill entirely in accordance with the recommendations of the Royal Commission presided over by the Duke of Richmond, and in pursuance of which recommendations the special instructions were given by the House of Commons to the Select Committee to which the Bill was referred; and it is also the first attempt to carry out the suggestions contained in the letter recently addressed by H.R.H. the Prince of Wales to the Society of Arts.

Your Committee willingly admit that a certain responsibility is proposed to be cast upon the Corporation, who have been avowedly dealt with by the Select Committee, not as a Water Company, whose only or main object would be to obtain satisfactory dividends for Shareholders, but as an important public body to whom large powers are proposed to be given by the Legislature in the full confidence that as the result, and without undue pressure on the Corporation, great benefits will be secured, not only for the city and district which they immediately represent, but also for other large and important districts much in need of water.

Your Committee unanimously recommend the Council to authorize and direct that application for the Bill be made during the next session of Parliament.

The Mayor moved—"That this Council hereby approves of and directs the promotion by the Council in Parliament of a Bill for the purpose of empowering the Corporation to obtain a supply of water from Lake Thirlmere, in Cumberland, and for other purposes; the costs and expenses of such promotion to be defrayed out of the public funds or rates in the hands of the Council, or hereafter to accrue to them on water-works account."

Alderman Grave seconded the motion.

Alderman Curtis moved as an amendment—"That, as no further evidence has been furnished to the Council by the Water-Works Committee as to the necessity of an immediate supply of water being required, a committee be appointed to consider if a further and immediate supply is required, and, if so decided, to consider and report from where such supply can best be obtained, and carefully to examine any estimates which they may obtain, and to report as to their reliability, and also to consider and report whether it is not desirable that such new works should be carried out by and at the expense of a union of towns or districts, as recommended by the Royal Commission, instead of by and at the risk of Manchester alone, and to submit any further suggestions which they may deem desirable."

Alderman King seconded the amendment.

The Town Clerk, at the request of the Mayor, read the following statement prepared by the Water-Works Committee:—

Reference to Mr. Bateman's report of Sept. 18, 1850, will show the estimate made, at the time the two Acts of 1847 and 1848 were passed, of the quantity of water to be secured.

When the first Act (1847) was passed, it was estimated that 15 million gallons per day to the town, and 60 feet per second to the mills, would be obtained at a cost of £327,000.

When the Act of 1848 was passed, it was estimated that 30,000 gallons per day could be brought to Denton and Gorton for an outlay of £455,300, including £100,000 for piping in the town.

By reference to the inquiry before the surveying officers and to their report it appears that the estimate of 30 million gallons per day for the town, besides 75 feet per second to the mills, was based on an assumed available rainfall of 42 inches; and in the same report it is stated that an available rainfall of 36 inches would afford to the town 23,079,450 gallons, in addition to the 75 feet per second to the mills.

The observations upon which Mr. Bateman calculated the available rainfall at 42 inches were principally the observations, extending over three years, made in the Swineshaw Valley, immediately adjoining Longdendale, and observations limited to twelve months only in the Longdendale Valley.

In 1846 and 1847, when the works in Longdendale were designed, no gravitation works of any magnitude had been executed in this country, and at that time no continuous rainfall observations in hilly or mountainous districts had been made, except for the two or three years upon which Mr. Bateman's calculations were based.

There is no question that engineers at that time over-estimated the available rainfall and under-estimated the length of droughts, and consequently the amount of storeage required to utilize the rainfall; and it is equally certain that the amount of compensation which at that time, and for several subsequent years, was given to the streams, both in the Longdendale Valley and in other districts, taken up for water-works purposes, was largely in excess of that which subsequent experience has shown the mill-owners can, under ordinary circumstances, usefully employ or reasonably expect.

It is certain, also, that the calculations in 1846, alike as to the available rainfall, length of drought, and capacity of reservoirs to utilize the rainfall, have not been verified by the experience of subsequent years. All these facts are, however, fully stated in the report which Mr. Bateman, on Oct. 7, 1868—nearly ten years ago—presented to the Water-Works Committee, in which report he states that "it was assumed we could collect 36 inches of rain in a year, probably more, and that storeage to meet the requirements of a drought of 80 or 90 days would be ample."

The rainfall has proved less than was assumed, and the droughts much longer than were anticipated. The experience of the years 1852, 1864 and 1865, and 1868, had not then been obtained. The year 1852 showed that, instead of 80 or 90 days, 120 days storeage was requisite; 1864 and 1865 showed that 150 days were required; and the year 1868 showed that, to be quite safe, it was desirable to provide for 180 days drought.

Experience has also shown that the available rainfall, instead of being 42 inches, or even 36 inches, can only be safely calculated upon as 33 inches on the average of two consecutive dry years.

The meteorological observations for the past 30 years have not only taught engineers the lengths of droughts and the available rainfall of dry years, but they have also furnished information as to the magnitude of the floods which may occur.

When the works were proposed in 1846 and 1847, the great floods of February, 1852 (when the Bilberry reservoir was destroyed), August, 1856, May, 1862, and November, 1866, had not occurred, so that in addition to new reservoirs required for the storeage of water, works for dealing with floods of the magnitude above named had to be designed and undertaken by the Corporation, in order that the water obtainable from Longdendale might be fully utilized.

Already in 1853 it was apparent that the compensation to the mills was in excess of that which they could usefully employ, and, by arrangement with millowners interested, power was obtained by Act of Parliament in 1854 to purchase 20 feet out of the 75 feet guaranteed by the Act of 1848.

Cost of Works.

Allowing credit for the utmost expenditure which has taken place up to the present time, the results are as follows:—

Works in the Longdendale Valley, including the Godley and Denton reservoirs and main-pipe to Ardwick, as per report of Mr. William Aldred, Public Accountant, Dec. 31, 1856	£428,235	12	4
Land and compensation	136,179	14	7
Damage by floods	2,769	17	11
Expended, by order of the Water-Works Committee, on the above works since 1856	39,642	1	8½
	£609,816	6	6½

In this amount is included a considerable expenditure required to overcome difficulties which Mr. Bateman, in one of his reports (July 25, 1855), describes as "of an appalling, almost an overwhelming description."

The item £428,235 12s. 4d. is, as ascertained by Mr. Wm. Aldred, Public Accountant, the amount actually expended to the end of 1856, in the execution and completion of the works included in the estimate of £455,300 made by Mr. Bateman prior to the obtaining of the Act of 1848. Mr. Aldred, in his report, states that the estimate of Mr. Bateman for such works (exclusive of piping the borough) was £311,900, and the actual cost, as ascertained from the vouchers, £428,235, showing an excess of expenditure over the estimate of £116,335. Attention is specially directed to this item, because it is this estimate which has been much commented upon, and has been somewhat strangely placed in contrast with the gross expenditure in the water-works department.

The cost of the works executed since 1860 for increasing the storeage, for purchasing the compensation down to 55 feet per second, for dealing with the floods, and also for the purchase of land round the reservoirs to prevent and preclude the possibility of fouling, has amounted to the sum of £398,336 9s. 9d.

In addition to the above sums must be added the following items, in order to show the total amount which up to the 31st of December last had been expended in works in connection with the water-works of the Corporation:—

Piping in and for the districts of supply, now including 36 townships	£371,723	10	4
Purchase of additional land in Longdendale and at Denton and Audenshaw, &c.	289,808	1	5
Hyde Road pipe yard	3,062	13	9
Prestwich reservoir and 30-in. main from Godley (Mr. Lynde's scheme)	190,551	3	2
Paid to contractors on account of construction of reservoirs at Denton and Audenshaw	74,820	4	4
Interest during construction of works, &c.	27,536	12	5
Mr. Bateman's commission to end of 1856	12,454	1	1
Legal and parliamentary expenses	22,963	1	9
Miscellaneous expenses	5,918	15	0
	£996,808	3	3

Amount paid for the works of the Manchester and Salford Water-Works Company, viz.:—	£533,820	3	2½

Summary.

	£600,816	6	6½
	398,386	9	9
	996,808	3	2
	533,820	3	2½
	£2,529,833	2	9

If to this amount the sum of £34,068 6s. 2d., expended at or in connection with Thirlmere, be added, it makes, as stated in the last annual report presented to the Council, a total expenditure up to 31st of December last, in the water-works department, of £2,563,901 8s. 11d.

It was only in February of last year, after nearly 30 years labour, anxiety, and responsibility, that Mr. Bateman was able to report that all the difficulties had been surmounted, and for the first time to refer to the completion of the works in Longdendale.

Notwithstanding the additional and enlarged works, and consequent increased expenditure, which for the reasons before given have been found to be necessary, it may still, it is believed, be truly said that Mr. Bateman has devoted 30 years of the best period of his life to the designing and successful completion and carrying out of, when their magnitude is considered, the cheapest gravitation water-works in the world.

Manchester Corporation Water-Works.—*August*, 1878.

Table showing Increase in Consumption of Water.

Year.	Average Quantity of Water supplied per Day.	Increase per Cent. in 5 Years.	Increase per Cent. in 10 Years.	Increase per Cent. in 15 Years.	Increase per Cent. in 20 Years.	Increase per Cent. in 22 Years.	Increase per Cent. in 23 Years.
	Gallons.						
1855	8,078,152						
1860	10,907,183	35					
	Trade depression Cotton famine.		38				
1865	11,156,433	2¼	81	78			
1870	14,315,877	28½		Or 5 1-5th per cent. per ann.	112		
1873	17,133,434	19½	53½				
	Trade depression Very wet year.	Aver. 21½ per ct., or 4½ per ct. per ann.	Aver. 41 per ct., or 4·1 per ct. per ann.		Or 5 3-5ths per cent. per annum.	95	
1877	15,742,800	8 decrease in 2 years				Or 4 1-3rd per cent. per annum.	113
1878	17,212,300	9½ increase in 1 year.					Or 5 per cent. per annum.

Taking consumption in 1877, and allowing for increase at rate of past 22 years, the total supply of 24½ million gallons per day will be exhausted in 13 years.

Taking consumption in 1877, and allowing for increase at rate of average past 10-year periods, the total supply of 24½ million gallons per day will be exhausted in 13½ years.

Taking consumption in 1877, and allowing for increase at rate of average past 5-year periods, the total supply of 24½ million gallons per day will be exhausted in 13 years.

Taking consumption in 1875 or 1878, and allowing for increase at rate of average past 23 years, the total supply of 24½ million gallons per day will be exhausted in 8½ years.

Taking consumption in 1875 or 1878, and allowing for increase at rate of average past 10-year periods, the total supply of 24½ million gallons per day will be exhausted in 10 years.

Taking consumption in 1875 or 1878, and allowing for increase at rate of average past 5-year periods, the total supply of 24½ million gallons per day will be exhausted in 10 years.

It is thus seen that the increase of consumption has more than doubled itself during

the last 23 years, from 1855 to 1878, being equal to 113 per cent. of increase, or at the rate of 5 per cent per annum. This is equal to about 800,000 gallons per day upon the daily consumption of the present year (1878), and is, in fact, about the same increase shown to have occurred in the five years, 1869 to 1874.

In 1868 Mr. Bateman reported that from the best information the increase had been going on at the rate of one million gallons daily per annum. The accuracy of this statement will appear by reference to Table 3 in the report of June 20, 1877, presented by the Committee to the Council.—(*Vide* Consumption, 1866 to 1868.)

In 1875 Mr. Bateman stated that the supply in dry years could not be taken at more than 24 or 25 million gallons per day, and at the increase that had then been going on for the past five years, which appeared to be from 750,000 to 800,000 gallons per day, and during the past two years had been 1,200,000 gallons per day, the water would be exhausted in nine years.

It was upon the state of the circumstances in 1875, as set forth in Mr. Bateman's reports, that the committee acted and matured the scheme as presented to the Council. In the two following years—viz., 1876 and 1877—the consumption decreased on account of the excessively wet seasons, although, as before, the number of consumers and the revenue continued to increase, though the actual water used was less.

The consumption in the two years 1876 and 1877, being abnormally wet years, was not material, as was fully explained by Mr. Bateman to the committee, and of no use whatever as a guide to the consumption which would take place in dry years.

Mr. Bateman refers to the years 1876 and 1877 in his evidence, and says, "Although the number of houses put on during 1876 and 1877 was greater than any previous time, the quantity of water used was not so great, owing to rain falling in such a way as to prevent the necessity of watering the streets, watering gardens, and so on;" and again, "There is no doubt that had the years 1876 and 1877 been of the same character as the previous years, the population having gone on increasing, there would have been at least as great an increase as before in the consumption, though we cannot, of course, foretell whether the next four or five years will be wet or dry years."

At Thirlmere the storeage provided is 8000 million gallons, and in case of a drought of 100 days (70 days being the longest drought known), it would involve, in order to give the daily supply of 50 million gallons, the drawing off or user of 5000 million gallons out of the storeage of 8000 million gallons, leaving 3000 million gallons to assist the rainfall.

On the Longdendale works the storeage, when the additional reservoirs at Denton are completed, will be about 6000 million gallons. To secure a daily supply of 24½ million gallons in the case of a drought of 180 days (a drought of 150 days having occurred), it would involve the exhaustion of the whole of this 6000 million gallons of storeage.

In case, as suggested, an additional quantity of 4 millions per day, or one-sixth, could be obtained from the district (which, however, is not possible), it would require the storeage power of the works to be increased 50 per cent., or an additional storeage of 3000 million gallons, which also cannot be obtained.

After some considerable discussion, the amendment was put to the meeting, and lost by 42 votes to two—the mover and seconder alone being in favour of it—and the motion was agreed to by a like majority.

On Friday last a public meeting was held in the Town Hall, for the purpose of considering the resolution arrived at, on Wednesday, by the Corporation to apply again to Parliament for powers to obtain a supply of water from Lake Thirlmere. The Mayor, who presided, proposed, and Alderman Grave seconded, a resolution in favour of the scheme. The resolution was carried by an overwhelming majority, but Mr. Frederick Baxter and Alderman Curtis demanded a poll, which, according to the Act, cannot take place in less than fourteen days from the present time.

EXHIBITION OF GAS-STOVES AND APPARATUS AT WOLVERHAMPTON.

An Industrial Exhibition in Molineux Grounds, Wolverhampton, was, on Monday, the 29th ult., formally opened by the Earl of Dartmouth. The exhibition was due almost entirely to the enterprise of Mr. M'Gregor, the proprietor of the grounds, who conceived the idea of giving the manufacturers and artizans of the district the opportunity of bringing together specimens of their various productions and inventions, more especially those adapted to domestic use, and the principal feature of it was a large variety of gas cooking-ranges and other inventions of that character, such as were shown a few weeks previously in the exhibition at Birmingham, besides others of later and more improved design.

Referring to the gas-stoves and apparatus, the *Wolverhampton Chronicle* says:

"The articles forming the most noteworthy class in the exhibition are cooking-ranges, stoves, and heating apparatus of various kinds in which gas takes the place of ordinary fuel. These are of great variety, and some of most ingenious design and construction, and, as a whole, they afford an excellent illustration of the many purposes for which gas may be advantageously substituted for coal, whether in the house, the workshop, or in public institutions.

"The most extensive collection in this class belong to Messrs. J. Wright and Co., of Broad Street, Birmingham, who take the whole of the space from Stands 51 to 63 inclusive, and show thereon 27 cooking-ranges of various sizes and degrees of simplicity or elaborateness in their construction, and which they sell at prices from 25s. to 21 guineas. For one of these—an apparatus adapted to the wants of an artizan's household—they gained the silver medal at the recent show at Birmingham, besides obtaining honourable mention for an apparatus adapted to the requirements of a middle-class family of from six to ten persons. Since then the firm claim to have made further improvements in their reflecting cookers, having fitted them up with boilers, in which water can be heated by the waste heat from the baking and roasting parts of the stove. One of the ranges is fitted with white porcelain tiles, and all the stoves are furnished with a small thermometer, which is fixed outside the door of the oven. Amongst the heating-stoves on these stands is the Imperial ventilating stove, by which all the produce of combustion is carried away through a flue, none being allowed to escape into the room where the stove may be used. They also show what are termed 'Cheerful' stoves, hot-water apparatus for greenhouses, boiling-stoves, ironing, tailor's and tinman's stoves, a new instantaneous water-heater, a gas fire fitted into a grate with a marble mantelpiece, and a gas-engine, for which a prize was awarded at Birmingham last month.

"Messrs. Hassall and Singleton, Phœnix Foundry, Freeman Street, Birmingham, on Stands 3, 4, 5, and 6, have a very good show, principally of 'Birmingham' ranges, one of which is for coal and gas combined, the others being for coal. They have also tin gas-stoves from 8s. 6d. upwards, and on their stands too may be seen an ornamental Minton tile mantelpiece, specially designed to receive a large cooking-range, and the 'Phœnix' portable range, which is particularly suitable for camp life, being so made that the necessity of brickwork in fixing it up is obviated.

"On the adjoining Stands 7, 8, and 9, Messrs. Scott, Brown, and Co., of West Bromwich, display roasting, baking, and boiling stoves, and appliances adapted for the laundry and workshop. At Birmingham, the firm was successful in winning a silver medal for the best cooking apparatus adapted to the requirements of a middle-class family of from six to ten persons. It is called the kitchener, and consists of a lower compartment, where the meat is roasted by gas-jets placed above it, and the heat of which is reflected by bright surfaces. Above this is an oven, and at the side a boiler and tap, the whole being surmounted by a hot-plate, with jets for the heating of kettles and saucepans. Many of the other cooking apparatus are very similar in arrangement to this, but the prize medal kitchener surpasses most of them in the quality of its manufacture They also show an ingenious gas-stand for heating a laundry iron, which ensures no unnecessary expenditure of gas. When the iron is placed upon the stand the gas is put on full, but on being taken up again reduces the consumption to that of a single tiny jet, just sufficient to light the others when needed. Since the Birmingham show they have further improved their 'Nonpareil' cooker by making more space under the gas-jets, and adding an arrangement for warming plates.

"At No. 10 stand, Messrs. Bradbear and Millington, of Coventry Road, Small Heath, Birmingham, show their gas-stove for family use. It is a hot-water oven with boiler combined, and spaces are provided on the top for three fires for the purpose of grilling, boiling, and stewing respectively. The stove is sufficient for the purposes of a family of ten people. The makers have been very successful with their make since the Birmingham exhibition, where they took the second prize in the second class, notwithstanding that the stove has only been in the market about six months.

"Stand No. 11 finds a Birmingham tenant in Mr. W. H. Marklew, of Vittoria Street, who shows many kinds of gas cooking-stoves, boiling hearths, and iron-heaters, and, as a *spécialité*, a gas bracket boiling-stove, suitable for a bed or sick room, and so made that it can be fixed on the wall in the same manner as an ordinary gas bracket, thus dispensing with the troublesome elastic tubing.

"Messrs. C. Billing and Co., of Bloomsbury, London, who were large and successful contributors at the Birmingham show last month, are the holders of Stands 12 and 13, and have on view a number of articles which will repay inspection. Their baking-ovens, of which they show several, are something on which they pride themselves, and during the show they hope to convince the public of the value of the ovens by baking in them daily quantities of bread. One of their 'Sundial' kitcheners roasts meat, bakes, and at the same time heats the water in a moveable copper boiler, for which a place is made by the side of the oven. A number of this kind were shown in Birmingham, and we understand that the exhibitors effected many sales of them in that town. A 'Cheerful' stove shown is so fitted with flues as to retain the heat longer than most of its class do.

"On the stand next in number gas-heating and cooking stoves are again the chief feature, the exhibitor being Mr. J. E. Prust, of Broad Street, Birmingham, who submits, amongst other well-made and moderate-priced goods, a workman's stove, ingenious, yet simple, of handy size, with which he obtained a silver medal at Birmingham, and a similar prize at Newcastle.

"Next to this are several gas-baths shewn by Messrs. Ewart and Son, 346, Euston Road, London. In these baths atmospheric gas is used, and the objection formerly raised that in the use of atmospheric burners an explosion took place, which sometimes put out the flame, and was always more or less alarming, has been overcome. By an ingenious and self-acting process, the gas is lighted as an ordinary yellow flame, and is converted into atmospheric gas as the burner is turned under the bath, returning to a yellow flame when brought out to be extinguished.

"Ritchie's Gas Lighting and Ventilating Company, of London, are represented on Stand 18 by specimens of their patent apparatus, which is said to accomplish the threefold purpose of heating, lighting, and ventilating at the same time. It consists of an ornamental pillar with two lamps on each side near to the top. The pillar is hollow, and there are certain arrangements for carrying off any effluvia.

"Mr. A. Sweet, of Hampstead Road, London, who holds Stand 46, besides a sanitary system for flushing closets, shows a rapid water-heater for bath or family purposes, and a number of gas-ovens. The water-heating is effected by the passage of the water through tubes, arranged in plate fashion in four layers with gas-burners underneath the bottom coil, and the inventor undertakes in four minutes from the time of putting in to draw from the apparatus five gallons of water heated 40° above the surrounding atmosphere. The gas-ovens shown are specially adapted for places where gas is at a low pressure. There are burners both under and over the oven, and the products of combustion do not come in contact with the contents of the oven.

"Mr. J. Williamson, of Hatton Garden, London, shows, at Stand 45, a pair of gas-stoves for cooking purposes for family use. They are also fitted up with hot-water chambers for warming plates, &c.

"Mr. Müller, of Birmingham, shows his 'Alpha' gas-making apparatus which is specially adapted for villages and large establishments, where supplies of gas cannot be obtained from gas companies. By this apparatus the gas is made from gasoline simply by passing air over the spirit which impregnates the air, and after this is conveyed through pipes a pure gas is produced."

The various gas-stoves exhibited, and which were entered for competition for the prizes offered, were judged on Friday, the 2nd inst. The judges were Mr. W. B. Reynolds, confectioner, of Wolverhampton; Mr. J. Annan, Manager of the Wolverhampton Gas-Works; and Mr. J. S. Reeves, Secretary and Manager of the Bilston Gas Company.

The awards were as follows:—

Class 1.—Cooking apparatus suitable for the use of an artizan; to be representative, simple in construction, compact, and durable; to be capable of cooking, at a moderate cost, the daily meals of a family of from four to eight persons. 1st, J. Billing and Co.; cost, £2; consumption of gas, 24 feet per hour. Honourable mention, W. H. Marklew; cost, £2; consumption, 25 feet per hour.

Class 2.—Cooking apparatus, adapted to the requirements of a family of from four to eight persons; the apparatus to be capable of cooking the daily meals, including dinner of roast meat, two kinds of vegetables, and pudding, and also to provide a sufficient quantity of hot water for cleaning purposes, and boiling water for tea. Messrs. J. Wright and Co.; price, £3 10s.; consumption, 25 feet per hour.

Class 3.—Cooking apparatus adapted to the requirements of a middle-class family of from six to ten persons; the apparatus to provide for roasting, grilling, baking, broiling, stewing, frying, and toasting, and for a supply of hot water. Scott, Brown, and Co.; cost of apparatus, £5.

Class 4.—Complete family kitchener, adapted to the requirements of a family of from 10 to 16 persons; the apparatus to be sufficient for all cooking purposes, and also for a supply of hot water for the kitchen. Hassall and Singleton; price, £7.

Class 5.—Cooking apparatus to be used as an accessory in kitchens of large houses where a coal or coke fire is also intended to be used. Hassall and Singleton; price, £8.; consumption of gas, 70 feet per hour. The judges were of opinion that this was a very superior apparatus indeed, and deserving of special notice.

Class 6.—Best coal range. Bernard P. Walker (Eagle range).

Class 7.—Cheap workman's stove, for cooking in workshop. J. E. Prust; price, 8s. 6d.

Class 8.—The most cheerful and effective gas fire. T. D. Clare and Co. (patent open fire-stove); price, £3 10s.

The judges also made honourable mention of Messrs. Hassall and Singleton's combined gas and fuel range.

[Since the above was in type we have received a letter from Messrs. John Wright and Co., of Birmingham, printed in another column, and to which we direct attention.—Ed. J. G. L.]

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

(*Concluded from p.* 241.)

Mr. D. M. Nelson (of Glasgow) had arranged to read a paper descriptive of "A Graduatory Method of Condensing, Washing, and Purifying Coal Gas by a Combined System of Rotary Apparatus." He explained, however, that Mr. Davidson, of Glasgow, who was making experiments with the machine, was reluctant to give any data that were likely to be called in question.

This concluded the business of the day, and the company adjourned for dinner.

In the evening the members visited some of the many objects of interest in St. Andrew's, They were accompanied by the President, who gratified them by describing the various points of historic and local interest attaching to each.

A visit was also paid to the gas-works, which were minutely inspected, and a very pleasing and interesting conversation enjoyed, embracing various points of interest to Gas Managers—from retort-settings, scurfing-retorts, ascension-pipes, anti-dip pipes, main water-line regulators, condensers, washers, purifiers, &c.—as well as examining the cast-iron tank (81 feet diameter and 20 feet deep), with gasholder, now being erected. The filling of this tank with water, which for this purpose is drawn at St. Andrew's, formed the topic for considerable talk. Mr. Hall proposed to fill it from a source lower than the tank, through the pipe that will carry the gas supply to it when finished. The difference in level will be overcome by lowering the stand-pipe inside the tank, and when filled to that level the pipe will be added to it, and the remainder of the water required to fill the tank will be pumped from the stand-pipe outside.

Friday, July 12.

The President took the chair at 9.30 a.m.

The following paper by Mr. Robert Smith (Superintendent, Gas-Works, Darlington), being the successful competing paper for the prize given by Mr. Andrew Stewart, of Glasgow, was read to the meeting:—

ON THE BEST ARRANGEMENT OF GAS-WORKS AND GAS APPARATUS, AND THE PROPORTIONS AND FORMS OF THE VARIOUS APPARATUS AND APPLIANCES IN USE IN GAS-WORKS, WITH MODES FOR CALCULATING THE SAME, DEDUCED FROM ACTUAL PRACTICE.

I do not consider that this very important subject requires much of a preamble, so I do not purpose taking up any time in introducing the subject. It is enough to say that I believe a more important subject could not have been selected for imparting a general knowledge of the construction of gas plant, and the required dimensions of the different apparatus used in the manufacture and purification of coal gas. I will endeavour, in as plain language as possible, to express myself on the subject, and in a manner that may be profitable to those who are not in a position for acquiring a great amount of knowledge in matters connected with the erection of gas plant, also the mode for calculating the same, deduced from actual practice.

In the retort-house begins the process of gas manufacture; and I may also say, in the retort-house depends the prosperity of a gas concern. The condensing and purifying apparatus may be defective, yet the result may not be very serious if care is exercised; but if the retorts are defective, and incapable of expelling a proper quantity of gas from a given quantity of coal, the result will be disastrous.

The purifying and condensing apparatus are a secondary consideration, although no one can deny the fact—a very important consideration. Street-mains are assuredly also a very important consideration; but the gas must be manufactured before it can be lost in the street-mains, and it can be lost all the same, if from one ton of coal you only receive about 7000 or 8000 cubic feet of gas. My advice is, whatever may be delayed or forgotten, "Look to the retorts."

In forming data as the various sizes of gas plant required, it is necessary that I should have a standard to base the calculations upon; and as 20 millions is a very common annual production, I will take it for granted that works are required where the annual consumption, including "unaccounted-for gas," is 20 millions. It is always advisable to allow for a greater consumption than is actually consumed, and I will allow apparatus that can manufacture and purify 22 million cubic feet per annum.

If I divide the annual make of gas by 200, the product will, to a nearness, be the maximum 24 hours production. Thus 22,000,000 ÷ 200 = 110,000 cubic feet—the maximum 24 hours production. To produce this quantity of gas, the retort power will require to be as under.

A D-shaped clay retort, 2 feet broad, 14 inches high, and 9 feet long, will carbonize 15 cwt. of Scotch cannel coal in the 24 hours, each charge amounting to 2½ cwt., and remaining in the retort four hours. This retort, at a fair temperature, will produce 7125 cubic feet of gas in the 24 hours, or 9500 cubic feet for every ton of coal carbonized. To use round numbers, say each retort will produce 7000 feet every 24 hours. Sixteen retorts of the above dimensions, at the same ratio of production, will produce 112,000 feet per day of 24 hours, which is a trifle more than the maximum daily requirement. But in the construction of benches it is advisable to have one-third retort power remaining idle, to be lit up in cases of emergency. So it is necessary that seven beds, each containing three retorts, should be erected in gas-works of this magnitude, so that extra loss or consumption, a partial break-down in the benches, or other exigency, could be met by the lighting of additional fires.

If we carbonize English coal, a greater number of retorts will be required to produce 110,000 feet per day. Each retort, of the dimensions above given, would carbonize 2½ cwt. of coals in six hours, or 10 cwt. per day. This, producing 9500 cubic feet per ton, would be 4250 feet per mouthpiece, or, say, in round numbers, 4000 feet per day for each retort. 28 retorts, at the same ratio of production, will produce 112,000 cubic feet, and allowing one-third extra retort power as above, brings the number up to 37 retorts, or 16 more than is required when Scotch cannel is used.

It is of great advantage to have the coal-shed contiguous to the retort-house, and a line of railway running into it if possible. This building should be of sufficient capacity to contain six weeks storeage, and two cubic feet of area should be allowed for every hundredweight of coals. At this ratio, 40 cubic feet area is required for every ton of coals stored; this multiplied by 12 tons, the maximum quantity of coals used daily = 480, and this multiplied by 42 days = 20,160 cubic feet, the area required.

A coal-shed 70 feet long by 25 feet broad, with the coals built 12 feet high, gives 21,000 cubic feet, which would contain 525 tons.

The gas flows up the ascension-pipe, which is 6 inches in diameter at the bottom, and diminished to 5 inches at the top, into the hydraulic main.

I believe the D-shaped hydraulic main to be superior to the cylindrical, not only because the gas passage is greater, but because it is much easier attaching and regulating the dip-pipes. Cast-iron hydraulics I do not at all approve of, they are so cumbersome and heavy; indeed, cases have happened where the great weight brought down part of the retort-bench, causing considerable damage, not only to the settings, but to the hydraulic itself. An accident such as this is very awkward and annoying about a gas-works, and every care should be taken so that it may be avoided. The wrought-iron hydraulic main is much lighter, easier erected, and perfectly secure and safe when it has been erected, and considering that the difference in the cost is trifling, I have no hesitation in recommending its adoption.

I do not approve, even in small works, of erecting a hydraulic main less than 18 inches wide, because a hydraulic of, say, 12 or 14 inches wide has a tendency to increase the pressure on the retorts, and this should certainly be avoided.

The crude gas flows along the hydraulic main, and along the piping erected against the interior of the retort-house wall on its way to the condensing apparatus. I find from experience that it is advantageous to keep the gas in contact with the tar for a considerable distance, as a means of increasing the illuminating power. If the gas is ushered into the cold condensing columns, say at a temperature of 120°, the hydrocarbons are partly condensed; on the other hand, if the gas is kept in contact with the warm tar, while being reduced to about 110°, the volatile hydrocarbons are retained, and the illuminating power consequently increased.

I am satisfied that the retort-house piping is a good condenser, and should be generally adopted. In this piping the temperature of the gas is evenly reduced, and none of the light-giving properties are decomposed; but it is very reasonable to suppose that, if raw gas at a high temperature is immediately sunk into the cold ground, or brought in contact with any cold substance, such as cast or wrought iron condensing columns, the illuminating properties will suffer.

The crude gas is drawn through this retort-house piping to the annular condenser, which I believe is much superior to any other mode of atmospheric condenser.

It is not an easy matter forming an opinion as to what quantity of condensing surface is necessary for proper condensation of gas, because a great deal depends on the temperature of the retorts, the position of the hydraulic main, the length of piping through which the gas passes before entering the condensing apparatus, and the coals used. Some coals contain more aqueous vapour than others, and, therefore, require more condensing power. But if the gas enters the first column at, say, 90°, which would be about the temperature it would enter into the condenser shown on the ground plan which accompanies this paper, condensation could be efficiently completed.

It is generally considered that 150 square feet of surface is necessary to condense every 1000 feet of gas manufactured per hour. I am satisfied this is more than sufficient, and I find from experience that, if the gas enters the first column at about 85° or 90°, 130 feet of surface for every 1000 feet of gas manufactured per hour will reduce the gas to the lowest temperature to which it will be exposed.

The mode for calculation is as under:—

130 multiplied by 4½, in round nnmbers the quantity of gas manufactured per hour, equals 585 feet surface required.

Six condensing columns, the outer cylinder of each 18 inches in diameter, and the inner cylinder 14 inches in diameter, and 12 feet high, have each a cooling surface of 100 feet. This multiplied by 6, the number of columns, equals 600 feet, the surface given. Thus:

1·50 × 3·1416 = 4·70 area of outer cylinder.
1·16 × 3·1416 = 3·64 area of inner cylinder.

8·34 × 12 feet, the height, = 100 feet.

Where the horizontal condenser is erected, although I am not much in favour of atmospheric horizontal condensers—and one reason is because the cooling influence is greater on the one side of the piping than on the other; but, where it is erected, I am of opinion that 170 feet of surface is required for every 1000 feet of gas manufactured per hour, and the mode for calculation is as under:—170 multiplied by 4·5, the maximum hourly production, equals 765 feet, the area required. 246 feet of 12-inch piping is sufficient, as under:—1·00 multiplied by 3·1416, the circumference of a diameter, and by 246, equals 772 feet, the area given.

When the gas has issued from the condensing apparatus, it is supposed to be free from tarry and aqueous vapours, and reduced to its lowest temperature. It now passes through the exhauster. I have observed in a number of works that the gas passed from the exhauster into the condensing apparatus. This is certainly a mistake, because the tar should be deposited before the gas enters the engine-house. The engine and exhauster are, in fact, the only ornaments—with, perhaps, the exception of the station-meter and governor—about gas-works; but if the gas be not cleansed of this impurity before entering into the exhauster, this beautiful piece of machinery has more the appearance of a tar-pump than anything else, judging from the black oily matter that is ejected at the piston-rod of the gas cylinder. I will not venture to say anything in favour of or against the various arrangements of engines and exhausters, because I believe they can all do their duty fairly, and in selecting one it is more a matter of fancy than anything else; however, I must say that I prefer an exhauster with double cylinders, because the gas flows much steadier through the piping and apparatus than if there be only one.

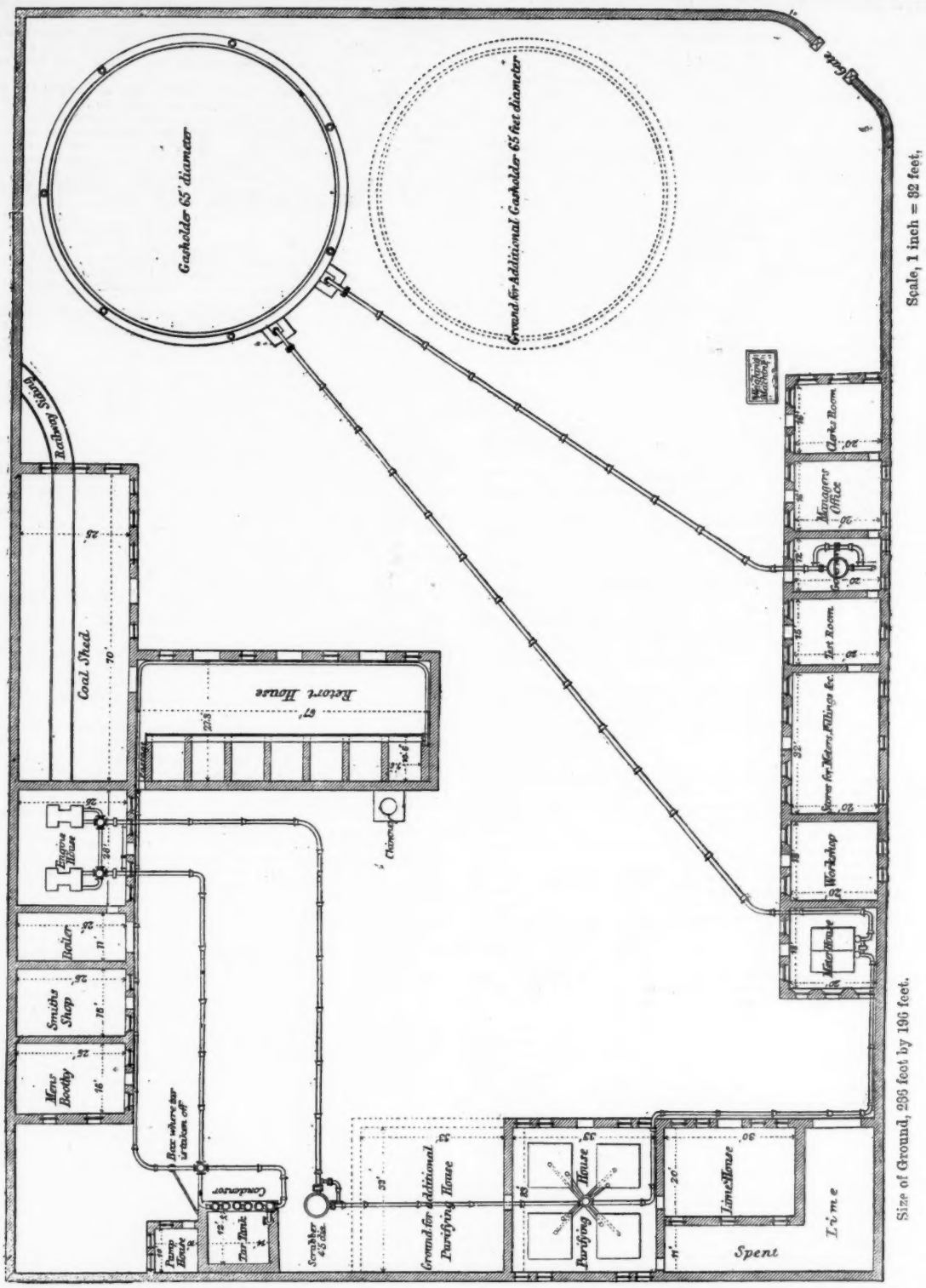
The principal impurities have now to be got rid of, and for the purpose of extracting the ammonia the gas is made to pass through square or cylindrical vessels—usually the latter—called scrubbers or washers, where it comes in contact with a falling shower of water or ammoniacal liquor. Although one volume of water will absorb about 780 volumes of ammoniacal gas, the impurity is not often completely extracted, and I believe it is simply because the gas is not brought in proper contact with the purifying water. If the scrubber or washer be an empty vessel, only part of the gas comes in contact with the purifying agent, and consequently the gas is only partly cleansed of the impurity. If the scrubber or washer be charged with coke, or bricks, or stones, tar will gradually close the passages, and the gas forces itself through by comparatively few routes, and consequently it is only partly cleansed of the impurity. I am satisfied that scrubbers should be charged with wood laths, about 3 inches deep, ⅝ inch broad, having ⅝-inch spaces between, and each tier of laths laid crossways with the other. The gas is thus divided into thin streams and presented to a large wetted surface, whereby the ammonia has every opportunity of being absorbed. This arrangement acts in the capacity of scrubber and washer combined.

I am convinced that more scrubbing and washing power is required than is generally supposed, and I believe that 2½ cubic feet area is not more than sufficient for every 1000 feet of gas manufactured in the 24 hours. A cylindrical vessel, 4·5 feet in diameter, and 18 feet high, erected on end, and charged with wood, as before mentioned, is sufficient where the annual production is calculated at 22 millions.

The mode for calculation is here given:—110, the number in thousands manufactured in the 24 hours, multiplied by 2·5, the space allowed per 1000, equals 275 cubic feet—the area required. 4·5 × 4·5 = 20·25; and this multiplied by 0·7854, equals 15·90; and this multiplied by 18 feet, the height, equals 286 cubic feet—the area given.

If the scrubber and washer be a square vessel, the calculation is this:—4 feet square equals 16 feet, and this multiplied by 18 feet equals 288 cubic feet—the area given.

When the gas has issued from the scrubber and washer, it is supposed to be free of ammonia; but the sulphuretted hydrogen, carbonic acid, and sulphur compounds are still present in the gas, and require removal. As all are aware, the two first-mentioned impurities can be effectually



removed by passing the gas through slaked lime, and a part of the last-mentioned impurity can be removed by the foul lime contained in the first purifier. The sulphuretted hydrogen can also be effectually removed by passing the gas through purifiers charged with oxide of iron; but oxide of iron has no affinity for carbonic acid or the bisulphide of carbon. I am of opinion that the carbonic acid should be at least partly removed from the gas, and lime only will remove it.

The great drawback in lime purification is that, when the foul lime is removed from the purifier, it absorbs carbonic acid from the atmosphere, and, in doing so, gives off the sulphur, which causes a very disagreeable odour. On the other hand, when oxide of iron is removed from the purifier, it absorbes oxygen from the atmosphere, and the sulphur falls as a solid. Another drawback in lime purification is that it is of little value after it has become charged with sulphur, or, as I should say, farmers and agriculturists do not appreciate its value as a manure; whereas oxide of iron can be revivified, and the sulphur becomes of marketable value. However, I have an idea that the day is not far distant when the sulphur present in the lime will be extracted, and become equally valuable. Meanwhile, notwithstanding these drawbacks in lime purification, I am in favour of it over oxide of iron, and especially in small works, where there can usually be found a quiet corner in which to store the foul lime.

I approve of having good large purifiers erected, and am convinced that the size I mention will be found quite sufficient.

Here is a handy rule for calculating the area of purifiers, when there are three always kept in action, and charged with four layers of well slaked lime 2½ inches deep:—Allow about one square foot in each purifier for every 1000 cubic feet of gas manufactured per day. The maximum daily production is 110,000 feet, and 10 feet square purifiers each have an area of 100 feet; and these, charged as before mentioned, are capable of extracting the impurities from the gas, without causing any inconvenience in the back pressure, or loss in lime.

About two years ago, at the works where I am engaged, we had only half a square foot area for every 1000 feet of gas produced per day, but now we have one square foot; and, although we purify 10,000,000 feet of gas more, the cost for lime is only about one-half (although the price per ton is the same) and the cost of labour only about one-half. This is ample proof that large purifiers, in addition to requiring less attending to, are more profitable than small ones.

Here is another method for calculating the area of purifiers, also deduced from actual working:—Allow the gas to be in contact with the lime from 17 to 18 minutes. Each purifier, 10 feet square, 4 feet 6 inches deep, and charged with lime, as before mentioned, has an area of 450 cubic feet. This, multiplied by three, the number in action, equals 1350 cubic feet. The maximum production per hour is 4583 cubic feet. So, if 4583 cubic feet pass through the purifiers in 60 minutes, 1350 feet would pass through in 18 minutes. I consider this the best mode for arriving at the area of purifiers.

When the gas has issued from the purifiers, it is supposed to be pure, and now requires to be registered in the station-meter. It is well to have a station-meter erected capable of registering a greater quantity than the maximum production, and I would erect a meter capable of passing 7500 feet per hour, because I do not consider it advantageous that any meter should be strained to its utmost.

After the gas has been registered, it flows to the gasholder, and it is very important to have adequate storeage capacity.

A rule very generally adopted about the Government works is to have storeage for two-thirds of the maximum 24 hours production. This is certainly very fair storeage accommodation, but I am of opinion that it should be even greater than this. We have but a faint idea, when a part of the working apparatus may get out of order, and we are compelled to lay off for a few hours—perhaps a full day—or we may have an unexpected heavy loss, or consumption, or other casualty, and if the holder area is small we cannot have a large supply of gas. I would say, let the gasholder capacity be equal to storing one day's maximum production.

A gasholder, 65 feet in diameter and 33 feet high, or two gasholders each 52 feet in diameter and 26 feet high, will contain that quantity. The mode for calculation is shown here:—

$$65 \times 65 \times 0{\cdot}7854 \times 33 = 109{,}504 \text{ cubic feet, or}$$
$$52 \times 52 \times 0{\cdot}7854 \times 26 \times 2 = 110{,}433 \text{ cubic feet.}$$

One day's maximum production is 110,000 feet.

As I am prejudiced against small gasholders, I have preferred the larger size, which will contain about the same quantity of gas as the two smaller ones combined, and the cost of erection will not be so great.

The proportion of a gasholder is this: the depth equals half the diameter when telescoped, and about one-quarter the diameter if a single-lift.

I do not consider it necessary that I should comment at all on the governor, its action is so simple and reliable. A governor with 6-inch connections, at a pressure of 1 inch, will pass over 5000 cubic feet of gas per hour at a distance of 1250 yards, but I would erect a governor with 8-inch connections, which makes allowance for a consumption of about double the maximum production.

The tar-tank is of brick construction, and should be capable of storing six weeks maximum production of tar and ammoniacal liquor. When Scotch cannel coal is carbonized at a fair temperature, it will give off about 10 gallons of tar and 15 gallons of ammoniacal liquor. English coal only gives about 7 gallons of tar and 14 gallons of ammoniacal liquor.

In midwinter, 12 tons of coal will be carbonized per day. This multiplied by 42 days equals 504 tons; and this multiplied by 25, the number of gallons produced per ton, equals 12,600 gallons, the maximum six weeks production. A tank 14 feet by 12 feet by 12 feet will contain that quantity. The mode for calculation is shown here: $14 \times 12 = 168$ square feet $\times 12 = 2016$ cubic feet, and this multiplied by 6·25, the number of gallons 1 cubic foot will contain, equals 12,600 gallons.

The piping which conveys the gas from the one apparatus to the other should be large. Six-inch piping, as I have before mentioned, is equal to passing the maximum production; but if we consider that the piping about gas-works is very subject to become partly choked with tar and water, which greatly interferes with the gas way, causing an inconvenient amount of "back pressure," which certainly damages the illuminating power of coal gas, we can be assured that it is advantageous to have large piping, easy working, and easy back pressures, so I would advocate that the piping connecting the various apparatus be 10 inches in diameter.

This paper is accompanied by an explanatory ground plan of works capable of producing 22 million feet per annum. The apparatus is of the same size and construction as mentioned and calculated for in the foregoing description.

It will be seen that the gas flows from the hydraulic main, along the retort-house wall piping. This piping is of wrought iron, for the purpose of being easier erected and causing little strain on the side wall.

When the gas and tar have travelled a considerable distance together, the impurity is run off into a box, from whence it flows to the tar-tank. The condensing apparatus has a foundation on the side wall of the tar-tank, and the piping is so arranged here that the gas has not necessarily to flow through the condensing apparatus.

The gas, after being condensed, flows to the engine-house, where there are two exhausters—one intended for winter, the other for summer use; or, if one be out of order, the other can be put in action; or the gas can be turned off both, and sent through the bye-pass. The gas now flows to the scrubber, which is adjacent to the condenser and the tar-tank. This scrubber has a bye-pass, formed by three water-valves, so that the gas can be turned on or off the vessel, as desired. The pump, for supplying this scrubber and washer with the purifying agent, is erected at the far end of the tar-tank, and against the boundary wall, so that tar can also be conveniently pumped from the tank into a cistern above, and run into the liquor carts, either inside or outside the gas-works enclosure. The gas, after being cleansed of ammonia, flows direct to the purifiers; from the purifiers to the station-meter; after being registered, to the gasholder; and from thence to the station-governor, which has also a bye-pass.

This design, which I submit to you, shows the position assigned to the apparatus, and to all the buildings required about gas-works, and is constructed in such a manner that the works can be extended to double their present size, without interfering with the apparatus already erected, or making them complicated in any way. I believe that, when gas-works are being erected, provision should always be made, so that the works can easily be enlarged, because we have not only one, but many instances where even small towns have doubled their population in a few years, and the gas company found themselves cramped for room for extensions inside, and the adjacent ground outside built upon. This is awkward, annoying, and unprofitable to any gas concern; and provision should be made that, as the population increases, the gas apparatus increases, without inconvenience, without complication, but in order and simplicity as it was, when the works were originally erected.

The reading of this paper was well received by the meeting, but no discussion followed.

It was moved by Mr. D. M. NELSON (Glasgow), seconded by Mr. R. S. CARLOW (Port Glasgow), and unanimously resolved—"That the thanks of the Association be recorded to the Principal and Professors of the United College of St. Andrew's for their kindness in granting to the members the free use of the great hall and other rooms of the college for the purposes of the present meetings," and the Secretary was authorized to transmit a copy of this resolution to those gentlemen.

On the motion of Mr. M'GILCHRIST (Dumbarton), the members accorded a unanimous and hearty vote of thanks to the President for the able manner in which he had conducted the present meetings, likewise for the great kindness and attention shown by him to every Member of the Association present on this occasion, not only whilst conducting the meetings, but also whilst visiting the various objects of interest under his guidance; also for his generous gift to each Member of the Association of "The Guide-Book to St. Andrew's."

The PRESIDENT, in reply, assured the members that any trouble he had been at had been far more than counterbalanced by such an expression of their approval, and the pleasure he had in adding to the success of the meeting.

A descriptive exhibition of apparatus in action next followed, which occupied the attention of members until the hour for departure for Dundee and the Tay Bridge.

On arriving at Tay Bridge station, the members were met by Mr. M'Crae, and were conducted by him to the Dundee Gas-Works. An inspection of the various methods in use at these works was made, and courteously explained by Mr. M'Crae and his assistant, Mr. Mitchell, special attention being given to the effective working of the Mann and Walker's patent scrubbers recently erected.

The party then repaired to the harbour, where, by previous arrangement, they were joined by a number of ladies, and all embarked on board the steamer in waiting to convey them on the trip round the Tay Bridge. The weather being magnificent, a delightful sail was enjoyed, and the gigantic proportions of the immense bridge were seen to the greatest advantage, and admired by every one.

Before disembarking, the PRESIDENT proposed, in the name of the Association, a cordial vote of thanks to Mr. M'Crae for the kindness and courtesy shown by himself and his assistant on this occasion, as well as for the trouble taken by him in making the very complete arrangements he had done for the convenience and enjoyment of the whole party.

This vote was carried by acclamation, and

Mr. M'CRAE having expressed thanks on behalf of himself and his assistant,

The meetings were declared closed.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of this district continues extremely dull, and the lower rates which have been ruling in the Manchester market since the commencement of the month have had no very material effect upon the market, as neither consumers nor merchants seem to apprehend any difficulty in securing supplies at low prices, and stocks are still accumulating. In other districts there is also no material change, and throughout South-West Lancashire the majority of the pits are only working about half time, with extremely low prices ruling for all classes of round coal.

For gas-making coals there are still a few inquiries in the market, but the majority of contracts which are being given out seem now to have been placed. Consumers generally seem to have been determined to get as long forward deliveries as possible, and in some cases contracts have been held over indefinitely, in the hope of forcing colliery proprietors to give way, but it is only in exceptional cases where tenders for delivery beyond the next twelve months have been obtained. Prices, however, for ordinary gas-making coals have ruled very low, and for good ordinary screened gas coal, at the pit mouth, the general average price has been about 6s. to 7s. per ton, with about 8s. per ton for good Arley; but for good cannel, of which there is only a limited production, prices have generally been steady.

Engine classes of fuel, in consequence of the small quantity of round coal now being screened, maintain late rates, but there is no push of orders even for these.

For coke there is only a very dull demand, and best Lancashire makes, delivered into the Manchester district, are quoted at about 20s., with the common sorts at about 15s. per ton.

The iron trade is without material change. The demand for present requirements continues very small, but there is a fair inquiry for forward delivery, and makers who are willing to contract into next year, at present rates, have not much difficulty in selling. The finished iron trade continues very dull.

The half-yearly report of the Wigan Coal and Iron Company, one of the largest companies of the kind in this district, which has just been issued, affords a pretty fair index as to the state of trade. The net profit for the half year has only been £2000, and £9000 is being drawn from the reserve-fund to pay a dividend of 1¼ per cent. per annum.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The shipments of gas coals continue to increase. Best sorts are in active request. Nearly all the leading Durham gas collieries are fully employed. Some of them are busy. There are better inquiries also for medium and second qualities of gas coal. Prices are unchanged—say, 7s., 7s. 3d., and 7s. 6d. per ton, best; 6s. 6d. for medium; and 6s. for other qualities. House coals are a little more asked after. But steam coals are about 2½ per cent. down in price, with a slight falling off in the demand. Shipping turns, in no instance, exceed two days—in many instances they are immediate.

The coasting freight market has rarely been lower at this season of the year than at present; 4s. per ton being paid steamers, and 5s. per ton sailing vessels to load coals for London. There is very little coasting business astir indeed. There are few continental orders; little doing for France, Holland, Germany, or the Scandinavian ports, and without much prospect of a better business. Rates to the Mediterranean are lower—fully 10s. a keel, and, except for Cronstadt, for which there is a little exceptional demand, Baltic business is down 5s. a keel. The general tendency of the freight market continues to favour shippers.

The iron trade of the North of England improves slowly, the sales are better but there is no great advance in prices. The shipment of general manufacturing goods does not show that there is much revival of business. Indeed, it was complained last week that the shipments to the Continent by regular steamers were, if anything, a trifle worse. The chemical market was not so buoyant last week; prices were a trifle weaker. Foreign merchants have no stocks. There are not many stocks of chemicals on this side of the water; they hang back, and no sort of "bulling" the market can get prices up. If they are forced up, they have a fatal facility of sliding down again. There are not many shipments of fire-clay goods abroad. The timber trade of the North of England is suffering very much from the effects of recent over-speculation. Prices are low, and a considerable difficulty is experienced in making sales.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

If Mr. Henry Aitken has not anticipated me, I hasten to make a slight correction of the statement that he was reported, in last week's JOURNAL, to have made before a meeting of the Hamilton Town Council. Instead of saying that the apparatus had been put up at Kilmarnock to test the process with which his name is so intimately identified, it should have been the Dalmarnock Gas-Works of the Glasgow Corporation. I think I have already referred, on one or more occasions, to the fact that the process was being tested at those works; for the present, however, it is suspended, I believe, although it is intended to put it in operation again.

At a meeting of the Linlithgow Town Council, held yesterday week the question of the price charged by the Gas Company for the gas consumed in the street-lamps was under consideration. One of the members of a

Committee appointed to meet with the Directors of the Gas Company on the subject, said he thought the time had come when the Council ought to take the gas-works into their own hands. He was prepared with a motion to that effect, and had no doubt but that it would be supported. Many other corporations had taken over the gas-works in their respective towns, and when it was done in Linlithgow the gas would be supplied for the street-lamps at a less price than was now being paid, and it would likewise be for the advantage of the consumers. At Hamilton, where the works were taken over by the Corporation, they were now supplying gas at 3s. 9d. per 1000 feet. At a future time he would bring forward a motion that the gas-works should be taken over at a valuation.

The example of Dumfries does not seem to have been referred to by the Linlithgow Town Councillor. It is only a few months since the final measures were completed for taking over the gas-works of that town by the Corporation, but already there are fears expressed that by the end of the first financial year the Gas Commissioners will find themselves, in their corporate capacity, in a state of bankruptcy, and that a gas-rate will require to be levied. The adjourned meeting of that body was held last Thursday, when Bailie Wood formally gave in his resignation as the Convener of the Gas Committee, and the feeling was so strong against him that a motion was submitted, which proposed to supersede him even as a member of the Committee. Eventually, however, his resignation of the convenership, pure and simple, was agreed to by a majority of 11 votes to 8, and a new Convener was appointed in the person of Mr. Shortridge, who is also the Convener of the Lighting Committee. In the letter to the Clerk, formally resigning his convenership, Bailie Wood stated that he was unable to produce the letter sent to him by Mr. M'Crae, Dundee, and which was so much desiderated at the two former meetings. There was also read a letter which had just been received from that gentleman by Bailie Wood, in which he expressed very much regret, so far as the Bailie was concerned, that a wrong construction had been put upon his declinature to furnish the communications which had passed between him and Mr. M'Crae in reference to the affairs of the gas-works. In order to remove any misapprehension, he thought it due to him to state most emphatically that neither by correspondence, word, nor deed, had he made the slightest attempt to influence his (Mr. M'Crae's) opinion in any particular, so far as either Mr. Malam or the management was concerned. During the progress of the discussion, it transpired that the annual make of gas at the works was 36 million cubic feet, and that the loss was about 10 million feet, and it was also stated that the average dividend provided for the Gas Company by the Manager (Mr. Malam), during the ten years prior to the acquisition of the works by the Town Council, was 10 per cent.

The Ayr Police Commissioners met last Monday, when the standing grievance between that body and the Gas Company was again brought up for consideration. From a memorial submitted by the Clerk, which had been prepared for the opinion of Counsel, it appeared that, by a contract entered into between the Corporation and the Gas Company in 1847 the latter acquired, with other associated rights—that of breaking up streets for the purpose of laying down and repairing pipes, &c., they at the same time undertaking to light the streets with gas at a specified rate during eight months of the year, and at 5s. per 1000 feet during the remainder of the year. This agreement lasted till May 20, 1860, and in the October of that year the Town Council entered into another arrangement with the Company, in which, however, there was no mention of interference with the streets, and in which they agreed to pay the same rate for gas as the public, under a deduction of 30 per cent. Although this contract was to last for three years, it continued by tacit consent the sole arrangement between the parties till 1875. The Company, however, latterly declined to allow more than 5 per cent. reduction on the price of gas consumed by the town, and refused to exhibit their books or accounts to the memorialists, to allow them to satisfy themselves as to whether the Company were implementing their agreement, they having, it appears, undertaken not to add to their capital from the surplus revenue, or pay more than 6½ per cent. dividend. The memorialists aver that the Company have increased their capital from the surplus revenue. The opinion of Counsel was asked on seven points, and after these and the detailed replies were heard by the meeting, the Provost made a few remarks, in the course of which he admitted that the opinion was against the Corporation. He also expressed himself as being astonished at learning that the consumers had no remedy. The subject was then allowed to drop; but, from a question afterwards put to the Town Clerk, there seems to be a probability that the adoption of the Burghs Gas Supply (Scotland) Act will soon be brought formally under the notice of the Commissioners.

At the meeting just referred to some discussion took place with regard to a circular bearing upon the lighting of the streets by the electric light. It was ultimately agreed to have a series of three trials so soon as the dark nights set in, the cost to be £10, providing that the Police Commissioners supply the motive power, belting, &c.

On Thursday last the Glasgow Corporation Water Commissioners met, when a report was submitted on the results of the system of night inspection, and of control over the water supply, as carried out in the six experimental districts of the city. The aggregate population of the area embraced by those districts was given as 60,096, and at the time when the controlling meters were put in operation the average daily supply per head was 53·1 gallons, and the night rate per 24 hours was 42·2 gallons. The results on the 6th of June last showed that the daily supply per head had been reduced to 33·7 gallons, and the night rate per 24 hours to 19·5 gallons—thus showing that the great saving was in consequence of the control of the water during the night. In one district, where the consumption was formerly 60 gallons per head, the reduction per night was as much as 41 gallons. The average saving over the whole area under experiment was 17·8 gallons per head, or an aggregate of 1,069,709 gallons per 24 hours.

During the month of July and the early part of the present month there was a great want of water for domestic consumption in many parts of Scotland, more particularly in some of the lesser towns and places of health resort on the sea-side. Paisley was greatly alarmed at the small rainfall during June, and the entire absence of rain during July, the reservoirs becoming exceptionally low. The watering of the streets had to be discontinued towards the end of July. At Greenock the rainfall was only 1·41 inches during the whole of July, notwithstanding the fact that it is proverbially the wettest town in Scotland. The quantity of rain which fell in the eight principal towns of Scotland in the month of July amounted to little over three-fifths of an inch, or one-fourth of the average rainfall of the same months, and is the least recorded since the year 1868. Fortunately a change in the skyey influences has set in during the past fortnight.

A new water-supply scheme for the town of Irvine has just been completed at a cost of about £40,000, and one costing about £3000 has just been completed and made available for the village of Kilmalcolm, which is fast becoming a sort of residential suburb, on a large scale, for Glasgow and Greenock merchants and other well-to-do people.

There was a considerable decline of prices in the Glasgow pig iron market last week, business being transacted on Friday afternoon at 49s. 3d. and 49s. 3½d. prompt cash, and 49s. 6d. one month. A very dull feeling prevails in the market, and the speculative element is very languid. Several makers have reduced their official quotations 6d. to 1s. per ton. The improvement in the manufactured iron trade continues, the demand still keeping up, and most of the works being now well employed.

The coal trade has not yet changed for the better, and business proceeds most sluggishly. Shipments remain comparatively inactive, while future prospects do not improve. Coalmasters in a number of instances experience much difficulty in keeping their pits fully engaged.

KEYMER AND DITCHLING GAS COMPANY.—On Monday, the 12th inst., a general meeting of this Company was held—Mr. T. Fieldwick presiding. The report showed a balance in hand of £106 7s. 9d., out of which it was recommended that a dividend of 2½ per cent. should be paid. The retiring Directors, Messrs. Chilmaid, Frape, and Smith, with the auditor, Mr. Sabine, were re-elected.

CHESTERFIELD WATER-WORKS AND GAS COMPANY.—An extraordinary meeting of the Company was held on Monday, the 12th inst.—Mr. R. T. Gratton in the chair—for the purpose of considering the advisability of increasing the capital of the Company. Extensions have been made to the gas-works of late, and it was resolved to raise £30,000 in new shares, to be allotted to the present Shareholders.

REDUCTIONS IN THE PRICE OF GAS.—The following reductions in the price of gas per 1000 cubic feet are announced:—Cheadle, 6s. to 5s. 3d.; Clitheroe, 5s. to 4s. 6d., from July 1 last, with a discount of 4d. per 1000 feet if paid within 31 days; Eastbourne, 5s. to 4s. 7d., from Oct. 1 next; Faversham to 4s., from July 1 last, and 3d. discount for prompt payment; Grantham, 4s. 2d. to 3s. 9d.; Nottingham, 2d.; Ripon, 4s. 7d. to 4s., from July 1 last.

ASHFORD GAS COMPANY.—The annual meeting was held on Monday, the 12th inst.—Mr. J. M. Linom presiding. The report of the Directors showed that the year had been a very prosperous one. Although the price of gas had been reduced 5d. per 1000 feet, the total gas-rental was within £8 of what it was the previous year. The Directors stated that they had made considerable additions and repairs to the plant, and it was now in a good state. They had also paid off bonded debt to the amount of £400, and recommended the payment of a dividend of £7 per cent., and of a further sum of £300 off the bonded debt. The report and balance-sheet were adopted, and Messrs. Hyland and Taylor, the retiring Directors, were re-elected.

SCARBOROUGH WATER SUPPLY.—At the quarterly meeting of the Scarborough Town Council, yesterday week, the Deputy Town Clerk read a report from the Water Committee, stating that since their last report to the Council both Acts—that of the Water-Works Company and that of the Corporation—had received the Royal Assent. The Water-Works Company's Act empowers them to construct and maintain a reservoir at Fylingdale, a reservoir with filter-beds at Scalby, a line of pipes from Fylingdale to Scarborough, and a line of pipes from Scalby to Scarborough, with the different requisite junctions and necessary works, and to impound or divert the several streams shown upon the plan. Clauses in the Act provide for the purchase of land that may be required in the prosecution of the works, and for the supply of water to the township of Scalby conditionally on the purchase of the Scalby Water-Works, the price not to exceed £1375. The Corporation's Water Act contains the necessary provisions for carrying into effect the agreement for the purchase of the undertaking of the Water Company, and for completing the transfer to the Corporation on the 11th day of October next. The Committee embody in their report the substance of a report presented by Mr. Filliter, C.E., to the Water Company, on the 22nd of September last, on the scheme proposed by him for obtaining, on the gravitation principle, an extra supply of water. A table showed that within the past ten years the daily consumption of water had increased from about 545,000 gallons to 817,000 gallons, or an increase of about 29,000 gallons daily for each year, and at this rate the maximum summer demand would ten years hence amount to 1,100,000 gallons daily. Any new source of supply should not only afford this quantity at once, but should be capable of furnishing double or more. The Committee recommend the appointment of an Engineer to confer with Mr. Filliter and report on his scheme, and generally as to the most desirable course to be adopted by the Corporation under all the circumstances.

WARRINGTON CORPORATION GAS SUPPLY.—At the usual quarterly meeting of the Warrington Town Council, held on Tuesday, the 6th inst., Alderman Davies, in moving the confirmation of the minutes of the Gas Committee, made some remarks in reference to the accounts which were published in last JOURNAL. He said that it was pleasing for the Committee to present their report, because they found that the working of the gas-works, under the terms of the purchase, had been far beyond anything they had prophesied or represented to the Council. He believed that if they would refer to the report laid before the Council, they would find that the Committee, when advocating the purchase, stated that they expected the working of the concern, after meeting all liabilities and providing for the various annuities, would probably leave a net gain in the first year of £1400. He had before him a statement of the working of the gas-works for the past twelve months, and instead of being £1400, as was predicted, the net profit, after paying everything, was £2830 6s. 5d. This result had been so satisfactorily beyond what was expected, and he was sure it was not only satisfactory to the Council, but would be equally so to the gentlemen who opposed the purchase. The accounts would be brought forward at the proper time, but he was so pleased with the result of the working that he could not help referring to the matter then. He believed that those who opposed the purchase did so from as worthy a motive as those who promoted it. But it was not to be expected that those persons could know as much about the matter as they who had gathered all the information which other people could not easily get at. Therefore, he was content to think that they opposed the purchase because they did not know as much as the Committee did. He would ask the Gas Committee to bring before the Council from time to time what they were going to do with the various moneys. In the first place there was the cost of obtaining the Act, preparing the transfer, &c., and this would be a first charge. Then there was the payment of the expenses of conducting the gas-works. Then provision had to be made for the bonded debt. Then there were the mortgages of the Corporation. After these had been provided for came the sinking-fund, and lastly there was the promotion of a reserve-fund. They were not bound to provide a reserve-fund of £10,000 at any particular time, nor were they debarred from using the sinking-fund for the purpose of paying off the annuities. At this early stage they were in a position to buy up the interest of those investors who desired to sell their interest in the gas-works, and he should recommend the Council to do that as much and as quickly as possible, as they were in this advantageous position at the present, owing, among other things, to the cheap price of coal. It was a special time for doing the work at a great profit, and it would be two or three years before they were called upon to provide any sinking-fund at all, so that if, during those three years they bought up as many annuities as possible, it would be a very good thing for the Corporation to do. The time they were allowed to pay off all the annuities and provide a sinking-fund was 53 years; and the time for the repayment of money borrowed for extension of works had been very properly extended to 75 years.

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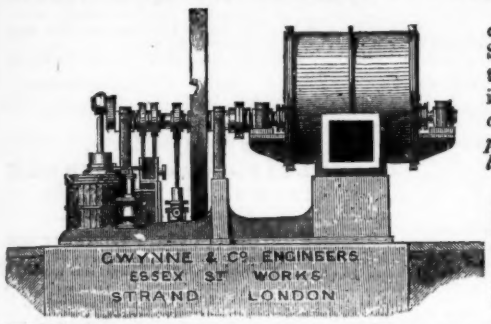

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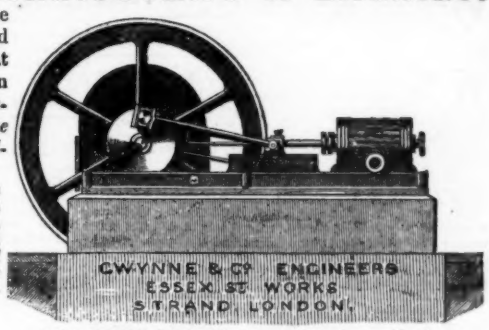

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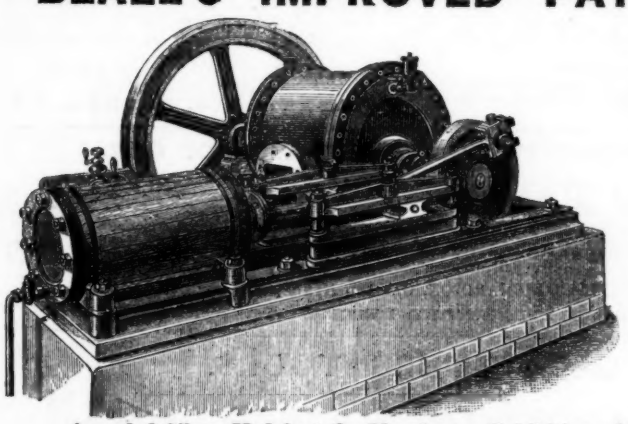

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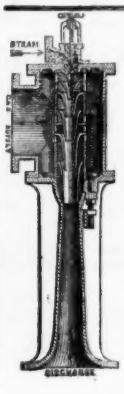

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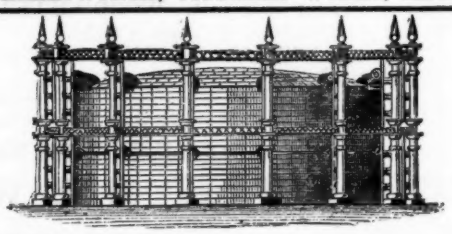

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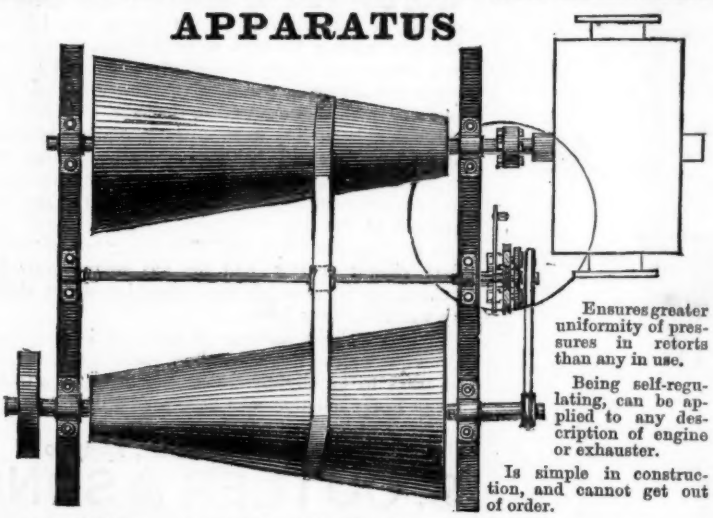

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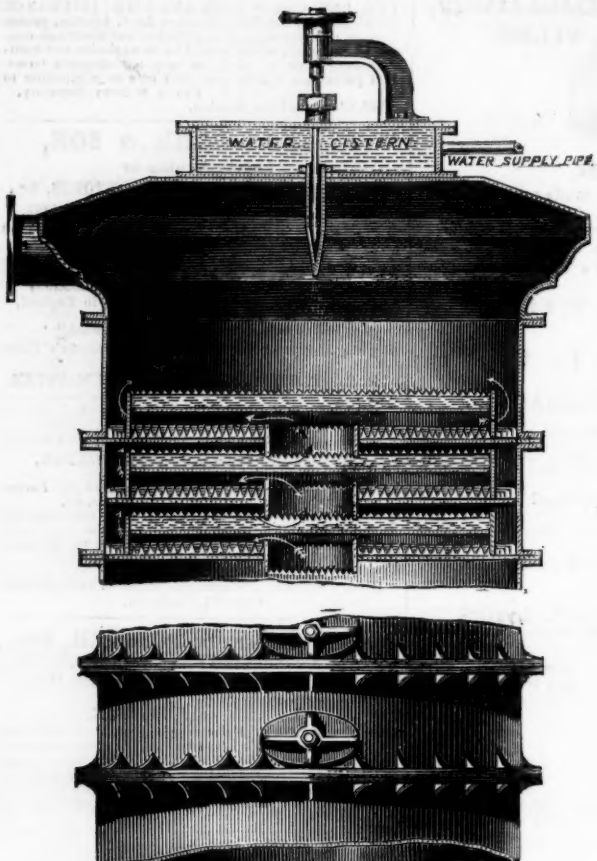
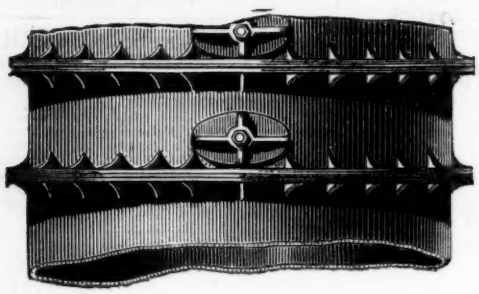
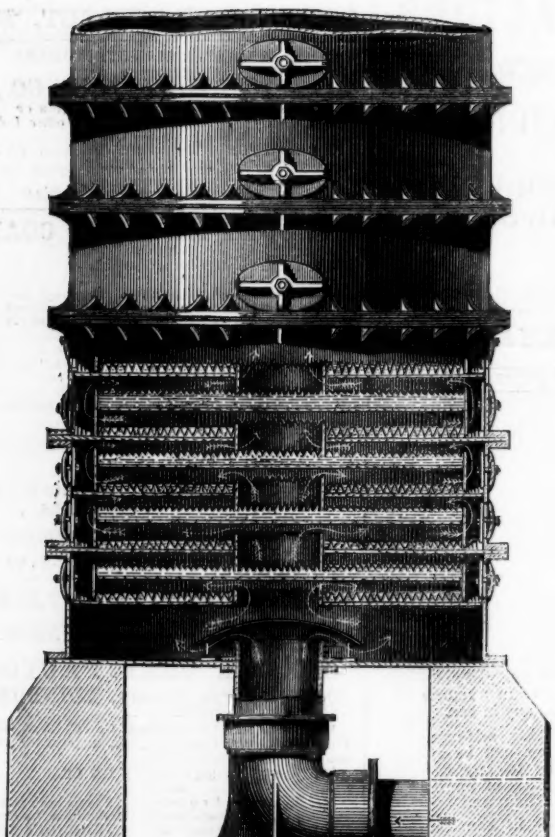
Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.







SAMUEL CUTLER & SONS

CONTRACTORS FOR GAS & WATER WORKS,
GENERAL ENGINEERS, IRONFOUNDERS,
AND
MANUFACTURERS OF

Gasholders, Tanks, Purifiers,

SCRUBBERS, VALVES, EXHAUSTERS,

IRON ROOFS,

BRIDGES, BOILERS, AND GENERAL CAST AND WROUGHT IRON WORK.

S. C. & Sons undertake the entire Erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the Supplying and Laying of MAINS.

They make a speciality of supplying every requisite whatever for a Gas-Work, keeping in Stock what are most in request. WOOD SIEVES for Purifiers and Scrubbers, of a superior make.

SPECIAL CASTINGS to Drawing or Pattern at Shortest Notice.

MANUFACTURERS OF

CUTLER'S PATENT GAS-WASHER

AND

MORRIS & CUTLER'S PATENT CONDENSER.

(For Illustration and Description, see "Journal" for Aug. 6, page 221.)

DESCRIPTION OF CUTLER'S PATENT GAS-WASHER.

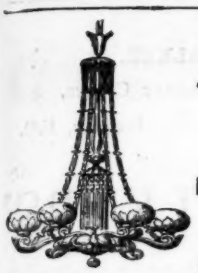
The Washer consists of a vessel or tower of a cylindrical or other form, convenient to the site available for it. The interior is fitted with a number of dished trays arranged as shown, one above the other, from bottom to top. The flanges or sides of these trays are formed with serrated edges, and are arranged so that each tray contains a certain depth of water or liquor; the position and size of the serrated orifices in the dipping edges being such that the upper parts are slightly above the water, and so that the combined area of these small orifices is proportionate to the size of the inlet-pipe, the gas passing through without increase of pressure, and diffused in thinly divided streams. All the other edges are likewise serrated, so that the liquor passes over same in small streams, and so that the gas cannot pass through in bulk. The water or washing liquor is admitted at the top, the supply being governed by a conical need'e regulating-valve so that the amount can be regulated to any desired quantity. The gas is admitted at the bottom and out at the top, the water or liquor descending the one meeting the other, and thus being brought into the very closest contact, and the gas consequently being deprived of its ammonia and other impurities absorbed by water or other liquor.

Where a slight increase of pressure is not of great consequence, we prefer to allow some of the lower tiers of trays to be slightly sealed, the better to arrest any tar or heavy oils that may have passed the condenser.

For further Particulars, apply to

S. CUTLER & SONS,

PROVIDENCE WORKS, MILLWALL,
(NEAR THE STEAMBOAT PIER,)
LONDON, E.



F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

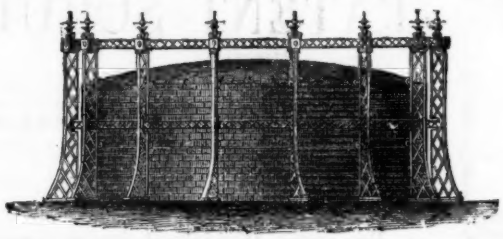
BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS, WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

MANN & OWENS' PATENT GAS-VALVE.

VALVE, with Indicator or Above Ground.

EVERY VALVE WARRANTED TO BE PERFECTLY SOUND AND GAS-TIGHT.

UNDERGROUND VALVE.

The advantages of this Patent Valve over all others yet introduced are, that it is always as tight as the best wedge or spring valve, without the possibility of setting fast or becoming suddenly leaky. The surfaces not being in contact during the operation of opening or closing, leakage through wear and tear is avoided.

The Gas Engineer will not fail to see the importance of such a valve in connexion with his purifying apparatus, particularly in the case of large sizes.

The slide being operated either by a screw and nut, or by a pinion and rack, a cam bearing upon a plane, cast on the back of the Valve, forces it against the face, and renders the escape of gas an impossibility. By a slight turn of the pinion or screw, the slide is released, and brought away from the face, by which means friction is avoided, and the only force required to open the Valve is that due to its own weight.

SOLE MANUFACTURERS:

S. OWENS AND CO.,

HYDRAULIC AND GENERAL ENGINEERS,

WHITEFRIARS STREET, LONDON, E.C.

PRICES, SIZES, AND FULL PARTICULARS ON APPLICATION.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Keep in London and at their works large stocks of PIPES and CONNEXIONS (1½ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

CHARLES HORSLEY, Agent.

THE

SILICA FIRE-BRICK CO.,

OUGHTIBRIDGE

Near SHEFFIELD,

Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces, and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

TROTTER, HAINES, & CORBETT,

BRETTELL'S ESTATE

FIRE CLAY & BRICK WORKS,

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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.

Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.

Successors to

E. BAKER AND CO., LATE BRIERLEY HILL, STAFFORDSHIRE.

HARPER & MOORES,

PROPRIETORS OF THE

BEST STOURBRIDGE CLAYS,

STOURBRIDGE.

Manufacturers of all Descriptions of

BEST STOURBRIDGE FIRE-BRICKS, LUMPS, AND CLAY RETORTS

Of all Dimensions for Gas-Works,

GLASS-HOUSE POTS & CRUCIBLES

Of every kind.

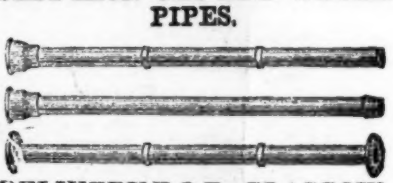
The Highest Award was obtained by H. & M., at the Philadelphia Exhibition, 1876, for Superior Quality of Manufacture.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

23 & 25, OSWALD STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.



DELIVERY F.O.B., GLASGOW.

Prices on application.

SLUICE VALVES.

The STRONGEST, CHEAPEST, & BEST in the TRADE.

HYDRANTS.

The Largest Variety of Improved Designs in the Market.

SPECIALITIES.

SLUICE VALVES for Water.
DO. for Gas and Sewage, 1½ to 48 in.
RESERVOIR SLUICES
AIR VALVES.
REFLUX VALVES.
BALL VALVES.
Compound HYDRANTS.
Straight-way Do.
Screw-down Do.
Ball Do.
Sluice-Valve Do.
STAND POSTS, various.
STREET WELLS.
STAND PIPES.
PATENT FIRE COCKS
STAND PIPES & JETS.
HOSE UNIONS and REELS.
LEATHER & CANVAS HOSE.
SCREW COCKS and FERRULES.

Tested with 600 to 1800 feet head of pressure.

J. BLAKEBOROUGH & SONS,

COMMERCIAL BRASS AND IRON WORKS, } BRIGHOUSE,
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Contractors to the British and Indian Governments.

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Where Samples may be seen.

C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

BEST GAS COALS

DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

For Prices and Particulars, apply to

MR. S. J. DITCHFIELD,

LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Invention

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

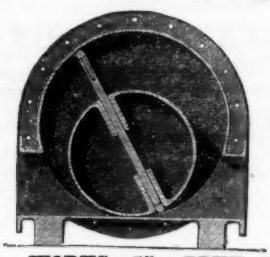
PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

J. BEALE'S NEW PATENT GAS EXHAUSTERS,

MANUFACTURED SOLELY BY

B. DONKIN & CO.



These Exhausters have but one solid slide, which ensures less wear and tear, and less friction, and thus fewer repairs are necessary. They are made with two outside bearings and all latest improvements.

MESSRS. B. D. & CO. ALSO MAKE

STEAM-ENGINES FOR DRIVING GAS EXHAUSTERS.
VALVES FOR GAS, WATER,
STEAM, HYDRAULIC MAIN, TAR, AMMONIACAL LIQUOR, &c.

WORKS: 55a, BLUE ANCHOR ROAD, BERMONDSEY, LONDON, S.E.

GEORGE NEWTON,

UNION STREET WEST, OLDHAM,

MANUFACTURER OF

SQUARE STATION-METERS, with PLANED JOINTS;

ROUND STATION-METERS, WITH CAST-IRON STANDS;

WET AND DRY CONSUMERS GAS-METERS, GOgovernors, &c.

PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & Co., GHENT, will receive immediate attention.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

CLOTH GAS-BAGS FOR MAINS.

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber, and Gutta-Percha Machine-Bands, Sheet and Washers, and Steam Joints.

T. BUGDEN, Manufacturer,
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TORBAY AND DART PAINT COMPANY, LIMITED.

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SOLE PROPRIETORS AND MANUFACTURERS OF

WOLSTON'S CELEBRATED

TORBAY IRON PAINTS.

TRADE MARK

These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Wagon Works, and the Paint Trade generally. They are the BEST PROTECTORS of WOOD, CEMENT, and IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to iron. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only to be thinned down for use in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead Colour.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
Light Green.	Iron Grey.

All other Colours made to order.

READY-MIXED PAINTS.

A great variety of Colours ready mixed for the brush are also always kept in Stock, in 3 lb., 7 lb., 14 lb., and 28 lb. cans.

Prices and Testimonials on application.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

DEAN'S PRIMROSE GAS COALS.

South Metropolitan Gaslight and Coke Company, London, July 12, 1878.

The Owners of the Dean's Primrose Colliery.

Dear Sirs,—I have much pleasure in stating that this Company have regularly used your Coals for more than thirty years, and that in all essential particulars they give the most satisfactory results.

The yield of Gas is from 9700 to 9800 feet per ton, of full 16 candles illuminating power, tested by the London Referees Standard Burner; and the Coke is of very good quality, while the quantity is about 40 bushels to the ton of Coal.

I consider Dean's Primrose Coals to rank amongst the first-class Gas Coals from the Durham Coal-Field.

Yours truly, GEORGE LIVESEY.

These Coals are also used by The Gaslight and Coke Company (London), and other English and Foreign Gas Companies.

Steamers loaded with quick despatch in the River Tyne. Price and other terms on application at the

FITTING OFFICE, NEWCASTLE-ON-TYNE.

HOLMSIDE GAS COALS.

South Metropolitan Gaslight and Coke Company, 589, Old Kent Road, London, S.E., Oct. 9, 1873.

At the request of Mr. Hedley, the owner of the Holmside Colliery, I have much pleasure in stating that, for about ten or twelve years past, this Company has taken at least half of its supply of Newcastle Coal from him. I can, therefore, confidently bear testimony to the good quality of the Holmside Coals, and consider they are equal to the best of the Newcastle Coals, in proof of which I may state that this year we are using those Coals exclusively, that the yield of Gas is from 9700 to 9800 feet per ton, and that the quality of the Gas, without any admixture of Cannel, is over 16 candles, as tested by the officer appointed by the Metropolitan Board of Works, using the London Gas Referees test.

The Coke is of excellent quality, and in quantity amounts to about 40 bushels from a ton of Coal.

The annual consumption of Coal amounts to about 75,000 tons.

GEORGE LIVESEY, Engineer and Secretary.

P.S.—I am at this date, Feb. 15, 1875, still using Holmside Coals as largely as ever, and am quite as well pleased with them as when I gave the above certificate.

GEORGE LIVESEY.

We are this year, 1878, using 80,000 tons of Holmside Coal. GEORGE LIVESEY.

FITTING OFFICE:

Address, 75, QUAYSIDE, NEWCASTLE-ON-TYNE.

M. BREMOND'S NAPHTHALINE PROCESS.

All negotiations respecting M. Brémond's patented process for preventing Deposits of

NAPHTHALINE

in Gas Main and Service Pipes should be addressed to Mr. W. H. BENNETT, 22, Great George Street, WESTMINSTER, S.W., or to M. BREMOND, Gas Engineer, Compania Madrilena de Alumbrado y Calefaccion por Gas, MADRID, who may be consulted upon all matters connected with the Gas Industry.

FERRAND DAVIES,

148 GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

AND

NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

Address—CHIEF OFFICES:

TEMPLE BUILDINGS, 50, NEW STREET, BIRMINGHAM.

GREAT SAVING OF LABOUR.

ENOCH'S PATENT

PORTABLE DRILLING-MACHINE,

Now in use by all the Principal Gas and Water Companies in the United Kingdom.

E Size, for Services in Pipes, 2 to 3 in. bore	£3 10 0
F Size, for Services in Pipes, 2 to 4 in. bore	4 0
G Size, for Services in Pipes, 2 to 6 in. bore, with Telescope Cramp.	4 10 0

Drills, 1s. 6d. each.

Machines sent on approval, if desired.

Prices for other Sizes and Modifications, with full Particulars and Testimonials, on application to

ALEXANDER ANDERSON.

Office: 9, London Street, E.C. Warehouse: Vine Street, Minories, London, E.

J. & J. BRADDOCK,

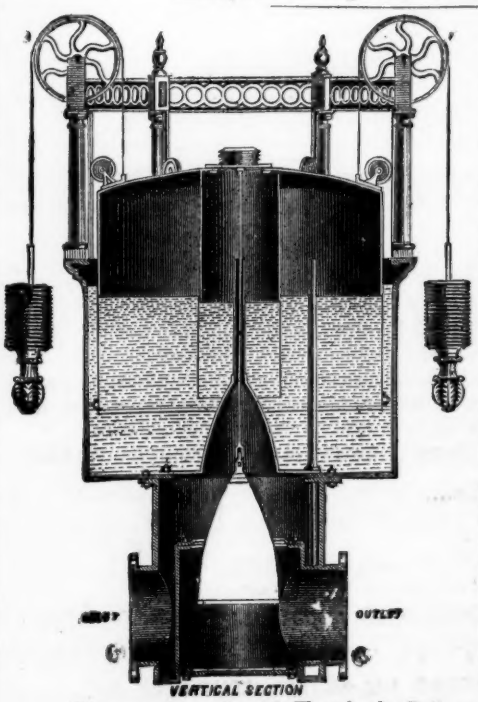
GLOBE METER-WORKS,

OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

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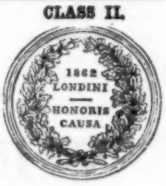

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